14TH ANNUAL COAL STRIPPING NUMBER

COAL MINING

April, 1958 Volume 35, No. 4

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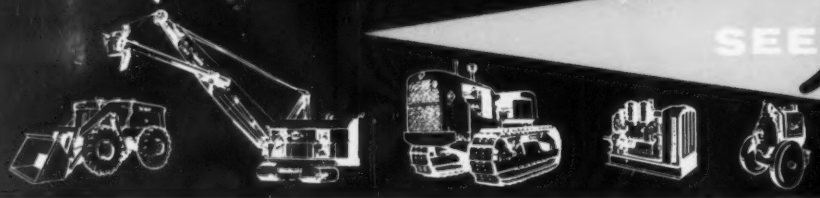

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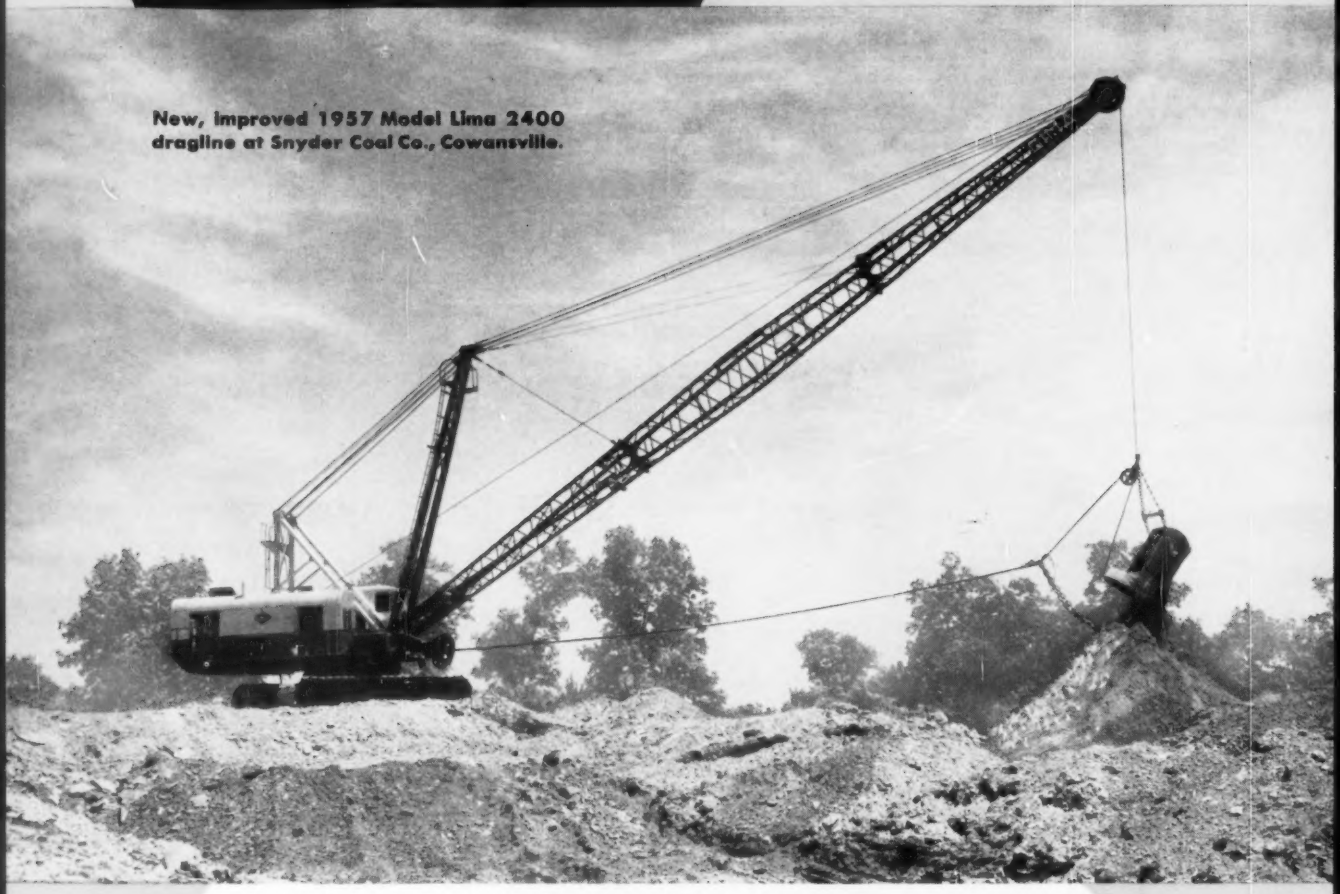

New, improved 1957 Model Lima 2400 dragline at Snyder Coal Co., Cowansville.

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Write for Bulletin M-101 and M-102

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World's Fastest Heavy-Duty Vertical Auger Drill

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Write for Bulletin M-100

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Bores up to 12" dia. holes to 150' depth faster, cheaper than any other horizontal drill. Requires less working space, saves many man-hours. . . operates easily in tight, hard-to-reach locations.

Write for Bulletin M-105

THE SALEM TOOL CO.
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SALEM

Published monthly by Modern Mining Publishing Company. Publication Office—Advance Printing & Litho Co., Erie, Pa. Editorial and Executive Offices, Erie, Pa. Pittsburgh Office: P. F. JASIK, Publisher, 4575 Country Club Drive, Pittsburgh 36, Pa. Price: In the United States, $3.00 year; all other countries $5.00. Single copy 25 cents. Entered as second class matter at the Post Office at Erie, Penna., under the act of March 3, 1879.

RUGGED D9's YIELD HIGH COAL

United Coals, Inc. of Harrison County, West Virginia, operates three D9 tractors with 9S Blades, 9 hours a day, 6 days a week, around the calendar. Fifty to 60 feet of overburden is stripped for an average 6 foot seam. The Cat D9's are used for stripping overburden, cleaning around a Northwest 80 D shovel, backfilling, and moving a 60 ton auger.

Lawrence A. Costelac, Secretary and Treasurer, a cost-conscious man, reports that United once used three different makes of machines but went to Caterpillar exclusively because they proved more dependable and economical. He says, "Realizing our rough working conditions and the tremendous yardages which would have to be moved rapidly and cheaply to make a profit . . . we turned to the Cat D9."

One of three Caterpillar D9 tractors equipped with No. 9S Bulldozers stripping overburden near Enterprise, W. Va. for United Coals, Inc. Note rolling action of moldboard that keeps dirt moving in front of the 14-foot blade.

PRODUCTION WITH LOW COST

Big coal production does not always mean high maintenance costs for stripping bulldozers. Actual cost figures on repair parts for the giant Caterpillar* Diesel D9 tractor on many jobs reveal that parts costs can often be kept lower than those of much smaller machines. Proper maintenance habits, of course, and skilled operators mean a lot. Most important, rugged construction and properly engineered assemblies in the D9 enable it to stand up under the roughest kind of earthmoving . . . coal stripping . . . and keep replacement parts costs to a minimum.

These savings, plus the tremendous work ability of the 320 HP Cat D9, pay off for more than 300 coal strippers in Pennsylvania, West Virginia and Ohio. Result is high tonnage, low cost per yard and long machine life.

If you want to boost your coal output, keep your costs down and profits high, let us tell you more about the high production D9. Better still, without obligation, we will arrange a demonstration on your job.

"We metered more than 10,000 hours on our three Caterpillar D9 bulldozers with less than $100 parts costs per machine before taking the first unit in for repairs," says Mr. Lawrence A. Costelac, Secretary and Treasurer of United Coals, Inc. of Enterprise, W. Va.*

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In 1951 Olga Coal Company bought 300 coal cars equipped with National NC-1 Trucks, National rubber cushioning devices, Willison Automatic Coupiers and Naco Steel Wheels.

Based on experience with the 300 original cars, Olga Coal purchased an *additional* 120 cars. And now Olga Coal has placed a *third* order for 40 more cars. This brings Olga's modern fleet up to 460 units—*all 100% National-equipped.*

This is typical of the swing to National-equipped mine cars—for safety . . . for longer life and lower maintenance . . . for lower per-ton mining costs.

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COAL MINING

Vol. XXXV April, 1958 No. 4

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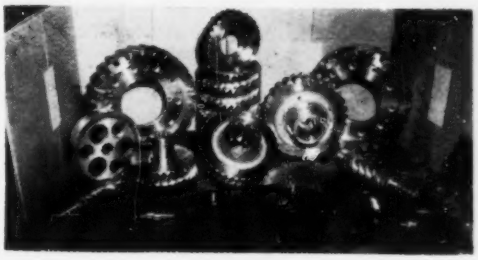

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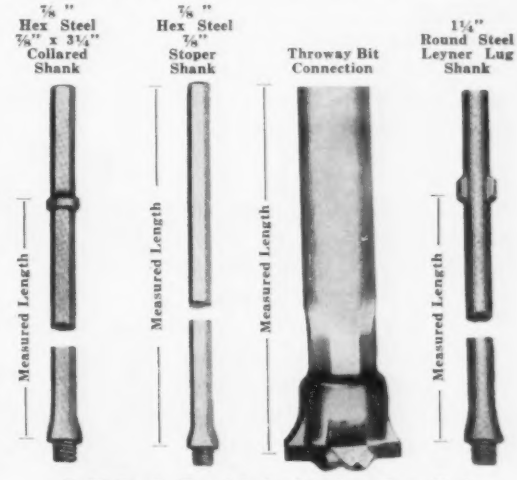
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Erroll H. Dexter
Clarksburgh, W. Va. Branch Mgr.
Beckwith Machinery Co.

Promotion of Max M. Snyder to the position of General Sales Manager for Beckwith Machinery Company has been confirmed by William H. Dickey, Vice President and General Manager of the earthmoving equipment dealership with headquarters in Pittsburgh, Pa. Company operations cover Western Pennsylvania, portions of Maryland and West Virginia.

Mr. Snyder was elevated from his previous position of Pittsburgh Sales Manager to fill the General Managership vacated by Mr. Dickey following his recent election as company officer by Beckwith's Board Directors.

Mr. Snyder first joined Beckwith in 1949 as a sales representative and was named Pittsburgh Sales Manager in 1955. He is a graduate of Pennsylvania State University. In his new position as General Sales Manager he will direct the efforts of Beckwith salesmen at Pittsburgh, Bradford, Clearfield, Erie, Pennsylvania and Clarksburg, West Virginia.

Mr. Frederick H. Bentzel, Clarksburg Branch Manager for Beckwith for four years, has returned to the Pittsburgh executive office to replace Mr. Snyder as Pittsburgh Sales Manager. Mr. Bentzel joined Beckwith in 1945, served as a salesman for several years, and is well known to the earthmoving indutry in Pennsylvania as well as West Virginia.

The post of Clarksburgh Branch Manager has been filled by Mr. Erroll H. Dexter, who prior to his managerial promotion, served as sales representative in five West Virginia counties. Mr. Dexter is a graduate of Westminster and became affiliated with the Beckwith organization in 1952.

JOHN E. CAFFREY

● John E. Cafffrey has been appointed chief engineer of U. S. Steel's Gary District, C. W. Connor, Jr., general superintendent, announced.

Born in Smock, Pa., he attended Saint Procopius school at New Salem, Pa., graduate from Uniontown Senior High and received a B. S. degree in mining engineering from West Virginia University in 1949.

He started with the Corporation in September, 1949 as chairman and successively held the positions of roof bolting inspector, senior draftsman, assistant mining engineer, project engineer, senior mining engineer, assistant district industrial engineer, and district industrial engineer, the position he held at the time of his recent promotion.

Mr. Cafffrey is the son of Mr. and Mrs. James Caffrey, Sr., Uniontown, Pa.

He served fifty-six months in the Navy, forty-two in World War II and sixteen in the Korean War.

Mr. and Mrs. Caffrey, the former Patricia Wallace of Uniontown, Pa., with their son, Kevin Wallace, reside in Gary, West Virginia.

What's the best all-around tractor for mining applications?

"Tournatractor can push-load two scrapers in the same time a crawler pushes one," says Supt. Jim Vaughn, of B & B Construction Co. Stripping overburden for M & M Clays, Inc.'s kaolin pit, rubber-tired tractors helped C Tournapulls load in just 48 seconds.

Wide, low-pressure tires gave good traction and flotation in wide variety of materials encountered on project. Other Tournapull features that helped speed production included 29.9 mph travel speed, exceptional maneuverability, instant-acting electric power system.

Ask A. S. Boone — whose B & B Construction Co. does a lot of contract stripping, mining, and hauling for clay operations in the "kaolin country" around Irwinton, Georgia. He'll give you strong arguments in favor of rubber-tired LeTourneau-Westinghouse Tournatractor®.

High crawler upkeep prompted switch to Tournatractor

B & B once used only crawler tractors. But when the firm's books showed that repair bills on 5 crawlers in 1 year totaled $30,000, Boone recalls, "It was time to look for tractors that would operate in sand, clay and water without high repair costs."

Two Model D Tournapull® scrapers B & B owned had cost only $450 in repairs for over 5000 hours of work. Because Boone and his men figured rock-bottom maintenance costs should run "in the family", they bought 2 new Tournatractors. Here's what's happened:

DOWNTIME: Tournatractor downtime has been only 10 days, compared to 30 per year *per crawler.*

LUBE TIME: B & B's work records show Tournatractor can be lubed in 5 minutes . . . far less than a crawler.

REPAIR COST: When the firm bought its 2 Tournatractors, it also purchased 4 C Tournapulls and a new crawler. *The maintenance cost of all 6 L-W machines has been approximately $4500, that of the one crawler approximately $2200.*

"Does work of 2 or 3 crawlers"

Has replacing 4 crawlers with only 2 rubber-tired tractors affected production? "Yes," says Boone, *"we get a lot more done!* Tournatractor does the work of 2 or 3 crawlers." For a sample of the kind of production B & B's getting nowadays, check the accompanying work report.

Tip: Why not take a close look at *your* crawler maintenance costs . . . then look at Tournatractor. Ask us for full details.

B & B's rubber-tired fleet strips 8,000 yds. a day

One of B & B's recent contracts involved stripping overburden at M & M Clays, Inc.'s kaolin pit at McIntyre, Ga. From top surface to kaolin, the 36' deep overburden included layers of clay-and-sand, pure sand, water-and-sand, and — just above the kaolin — a 3' layer of sticky gumbo. L-W Tournapulls, with Tournatractors pushing, kept production steady throughout the wide range of materials . . . clicked off 2290' cycles in an average of just 3.9 minutes.

C Tournapulls, with 18-yd. Fullpak* scrapers, pushed by husky Tournatractors, loaded in a hurry. Average load time was only 48 seconds; distance was 90'; and payloads averaged 11 to 12 yards of the heavy materials. When B & B used its full fleet of 4 C 'Pulls* and 2 Tournatractors, daily production averaged a big 8,000 cu. yds.

*Trademark CTCP-1573-MQJ-1

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- Quick-Way Truck Shovel Co.

What You Should Know About The Replacement of Anti-Friction Bearings

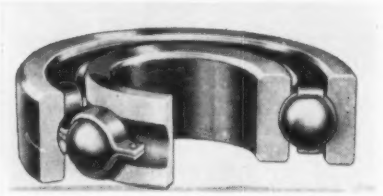
By C. V. BORHO
Service Engineer
Service Department
Caterpillar Tractor Co.

Anti-Friction Bearings are often ruined or discarded needlessly. You can save money by following these few service suggestions.

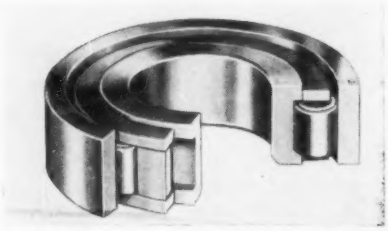
There are five basic types of anti-friction bearings. Each has a specific application although uses often overlap. The choice of a bearing used in original equipment is, quite naturally, up to the designer of the assembly of which it is a part. When replacement becomes necessary, it's very risky to use **any** bearing just because it fits a shaft and bore. To guard against this possibility, consult the manufacturer's up-to-date Parts Catalog and install bearings by part numbers. Installing a "will fit" bearing is asking for trouble.

Foreign matter and lack of lubrication are the most frequent reasons why bearings fail. When installing a new bearing handle it with care. During manufacture and storage, bearings are protected with a coating of lubricant and packed

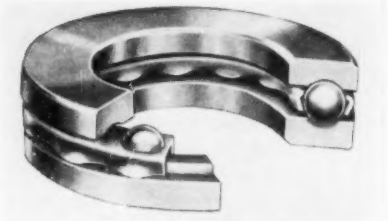
(Continued on Page 34)



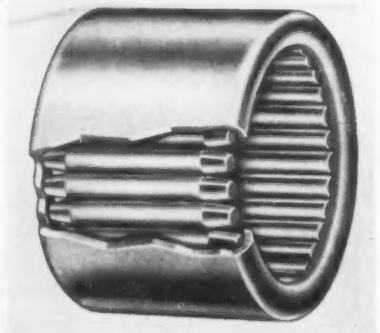
Cutaway of a BALL BEARING. This type bearing is used to absorb both lateral and radial thrust, usually in fast moving assemblies. Ball bearings are used in such applications as water pumps, fans and power take-off shafts.



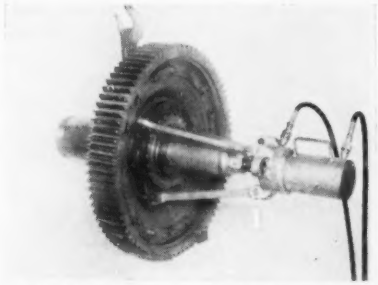
Cutaway of STRAIGHT ROLLER BEARING. This type bearing is designed to absorb strictly radial loads. Straight roller bearings are commonly used in both transmission and final drive assemblies.



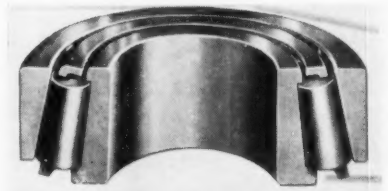
Cutaway of BALL THRUST BEARING. This type bearing absorbs lateral thrust. Ball thrust bearings are sometimes used in governor groups and sheave groups.



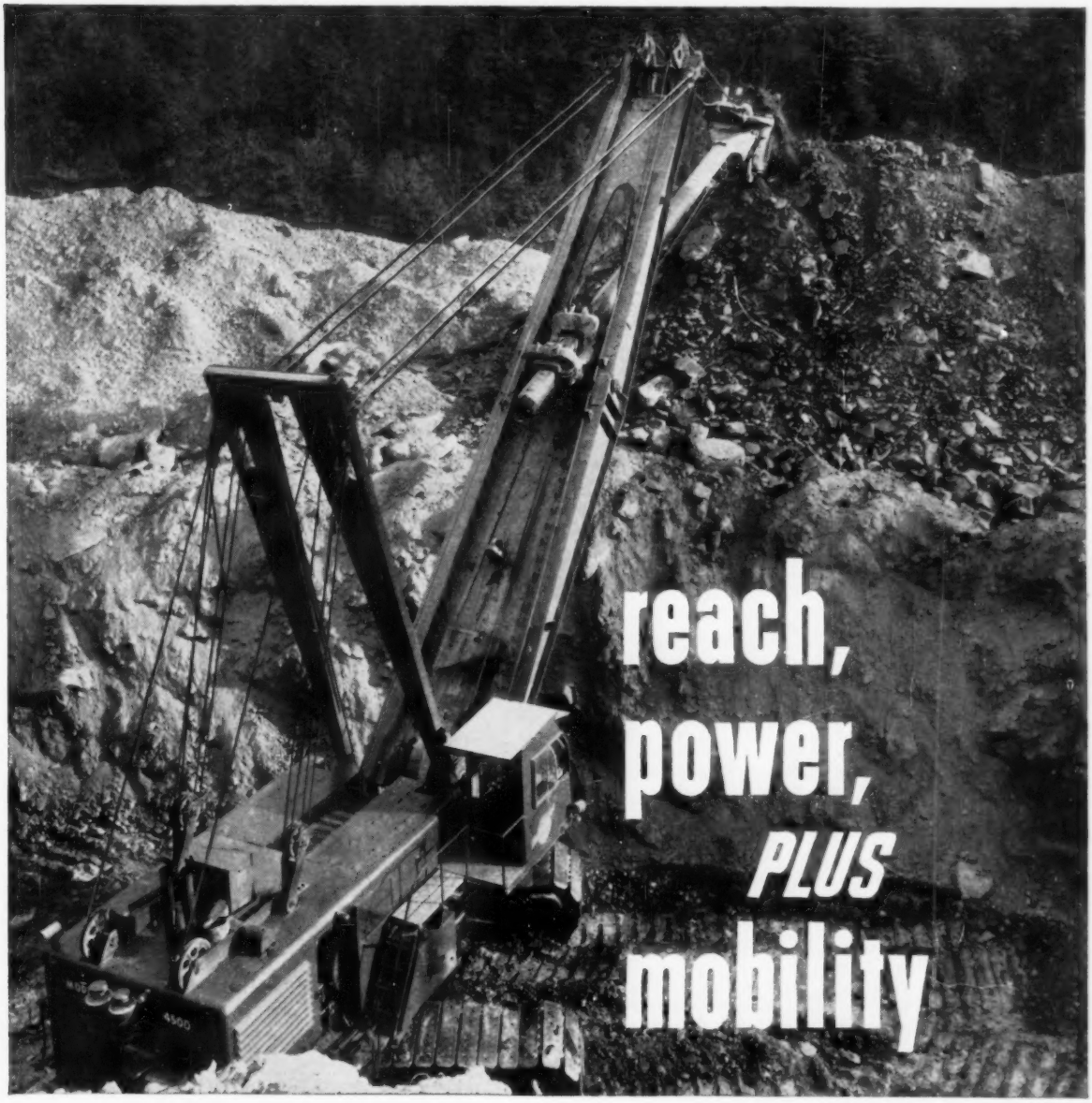
Cutaway of NEEDLE BEARING. This type bearing is used frequently in control linkages to assure equalized wear of the bearing surfaces and reduced effort in actuation of the mechanism.



Considerable care should be taken to avoid damaging bearings or their mating parts during removal. Improvised tools often do the job, but hydraulic pullers such as the one shown in this photograph or an arbor press are far safer and more efficient.



Cutaway of TAPERED ROLLER BEARING. This type bearing is designed to absorb large radial and lateral thrust loads. These bearings are used extensively in the final drives of crawler tractors.



5½-yd. SHOVEL DELIVERS TOP PRODUCTION IN TIGHT QUARTERS

Capacity alone is not the only measure of a real mining shovel . . . ability to move overburden *anywhere* at lowest cost can be a deciding factor. The Manitowoc 5½-yd. Model 4500 shovel is engineered from the crawlers up as a true mining machine . . . combining long reach, big capacity and reserve power with the all-important mobility to get in and work in close quarters.

A single diesel power package eliminates several electric motors, miles of wiring, control boards, delicate electrical connections, expensive power installations in remote areas and a restrictive trailing cable . . . the 4500 travels *anywhere*. Maintenance is simple . . . easily handled by your regular mechanics.

For consistently greater mining output the Manitowoc 4500 has simple, powerful main machinery having only 15 gears . . . simplified air controls . . . smooth, torque converter power. A 60 foot hi-lift shovel boom is available when more reach is needed . . . dragline booms in various lengths meet any job requirements.

Your Manitowoc distributor has many more profitable facts on the Model 4500 . . . get in touch with him now!

MANITOWOC ENGINEERING CORP. Manitowoc, Wis.

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Do You Know?

● Twenty years from now Americans will live in houses molded in one piece of plastic, surrounded by three-dimensional television in the walls and ceiling, and furnished with built-in utilities.

The homes will be self-cleaning, with dirt automatically flushed away. Clothing will be thermostatically controlled to warm or cool, and farmers will work their land from the air and watch their crops by television.

However, in order that the future life of luxury and leisure may come true, we must begin making plans and changing industrial concepts immediately, industrial designer Henry Dreyfuss told a meeting of the Society of the Plastic Industry.

Things will happen so fast, he said, designers and industrialists will have to discard the practice of deliberately making last year's products obsolete through design and style changes that accomplish nothing else. He said that in the America of a few years from now products will become functionally out-dated so rapidly "it will seem absurd to think up ways of making them stylistically obsolete."

Although many products appear on the market only a year after designers start work on them, he said, many others may be as long as ten years in design stages before they are ready for the public. It is the latter products designers must think about now, Mr. Dreyfuss said.

Designers must think of what will happen to their products ten or 20 years from the time the idea is conceived, and build the future into them now, he said.

Here is a glimpse of the things Mr. Dreyfuss believes Americans will enjoy 20 years from now.

Buildings that expand and contract to meet changing space needs; homes with built-in furnishings and utilities; three-dimensional TV on walls and ceilings; self-cleaning homes that automatically flush away dirt; plastic houses molded in a single piece.

Clothes and housewares designed to be thrown away rather than washed; clothing thermostatically controlled to warm or cool; factories, cars and homes run entirely by solar energy; monorails designed to carry private cars at 150 miles per hour; roads laid in a continuous strip.

Farms electronically cultivated by airborne agricultural machinery; oil pipelines extruded in plastic by a "pipe-mobile," and transoceanic closed-circuit television.

● Establishment of special schools to take care of talented boys and girls and give them special opportunities was recommended to the Seventh Thomas Alva Edison Foundation Institute on science education by Rear Admiral H. G. Rickover, USN, Chief of the Naval Reactors Branch of the Atomic Energy Commission.

Admiral Rickover charged that the ordinary schools do not give the opportunity necessary in a democracy to properly develop the abilities of the talented boys and girls, particularly those who are going into science and technology. He recommended the establishment of model academic secondary schools in about 25 different centers in the United States. These schools would have free tuition but they would give a very superior kind of student the highest scholastic quality. There would be at least one teacher for every 20 students. Schools would start with the fifth grade so as to have the pupils ready for college at age 16. The children would attend school for more than the conventional 180 days during the year. This would be accomplished by voluntary summer courses.

"I estimate that the cost of operating each model school for a period of five years will be about ten million dollars," Admiral Rickover said. "At the end of that period the community ought to have an option to take over the school, provided it agrees to continue the high scholastic standards set under private management."

Well-to-do parents have always had it in their power to assure their children a good education by sending them to private preparatory schools. But the talented poor child has had to depend solely upon the public schools. Admiral Rickover contended that education in a democracy must not only be democratic, but it must be a good and adequate education for the scientific and technologic civilization in which we live.

We cannot let Russia become the big brother to all the backward countries of the world, Admiral Rickover warned. Russia will soon have a surplus of trained manpower which she can export, whereas the United States, continuing at the present rate of production of scientists and engineers, will still have a shortage.

America must develop more inventiveness or expect to lose the economic and military race with Russia, a noted petroleum engineer and inventor warned.

The United States has been "scooped many times" by other nations and we can expect to be surpassed scientifically again, this time by Russia, unless we seek to discover, encourage and train more young inventors, Eugene Ayers, formerly in charge of research for Gulf Refining Company, cautioned in the forthcoming American Petroleum Institute Quarterly.

Mr. Ayres pointed out that the steam engine, motor car and locomotive, the internal combustion engine and many of its parts, wireless communication, X-rays and radioactivity, chemical catalysis and many other discoveries and inventions were the products of other nations.

The chemical engineer said we should have become "adjusted to the idea of other nations registering scientific firsts,' but, instead, the most recent foreign invention, the Russian earth satellite, was received in the United States as a "rude shock."

The reason for the "shock," Mr. Ayres said, is that everybody was aware of the satellite "with its dramatic military implications."

The United States still ranks first, the engineer said, in the capacity to develop ideas already conceived, but he warned there is a danger in the trend to specialization and "we may find that we lack the peculiar genius required" to recognize the value of basic discoveries and inventions.

As an example, he cited the "basic research" scholar whose work is devoted to collecting and classifying facts on a particular scientific subject.

"This, while it is essential to progress, is quite as unimaginative an occupation as the application of formulae by an engineer."

He added, " in both theory and practice the 'break-through' is accomplished by inventiveness."

"What we need," Mr. Ayres concluded, "is the scholar who can escape from the grooves of accepted theoretical knowledge and the engineer who can escape from his handbooks of formulae."

HERE AND THERE IN THE COAL INDUSTRY

THE 1958 TREE-PLANTING AT INDIANA STRIP MINES was started on the 32nd anniversary of organized planting by the industry. The Indiana Coal Association notes that this is the largest planting job in the State, and that the strip mines plant more trees on more acres than any other private industry and more than either the State or Federal Government in the public forests. Although some experimental planting was started by the strip mines in 1918 it was not until 1927 that a planned program of reclamation was begun. Except for a few war years when labor was scarce, an area at least as large as the area mined has been reforested or seeded to pasture each year. This year's planting of 1,472,000 trees on more than 2,200 acres is average for the mines. The area to be planted is scattered over eight counties.

THE EIGHTH ANNUAL SHORT COURSE in Coal Preparation will be held June 4 to July 16 by the School of Mines at West Virginia University at Morgantown. Designed for the practical man actively associated in his regular employment with the cleaning and preparation of coal to meet market specifications, the program includes both classroom and laboratory assignments. Classes meet from 8 A. M. to 4 P. M. daily. Information regarding registration, fees, text books, and other details can be obtained from G. R. Spindler, director, School of Mines, West Virginia University, Morgantown, W. Va.

Permissible Pete

In every job, there are always a few
who work harder than the others do.
Of these few, there is always one
that sees the job is correctly done.

Such a man is Permissible Pete,
toughest man you'll ever meet.
Whether judged by brain or measured by might,
he stands out front clear as day from night.

Coal is his business, blasting his task
(underground mining to those who ask)
But let's take a look at part of his day
and follow Pete along his toilful way.

Out at the mine as the dawn unfolds
he's anxious to find what the new day holds.
By checking his tools and seeing his crew,
he knows they're ready to start work anew.

Down into the mine and up to the face
where today's blasting will soon take place.
After undercutting the coal, Pete proceeds
to drill blast holes in the pattern he needs.

Then Permissible Pete shows us why
he's regarded as such a brainy guy.
Into each hole he expertly applies
permissible charge that Austin supplies.

With Austin dynamite, there's no doubt
about the results that now come about—
large lump coal with hardly any fines,
just what's wanted by profitable mines.

With coal quickly loaded, the men begin
the same operation all over again.
And so it goes as time passes by,
with daily tonnage exceptionally high.

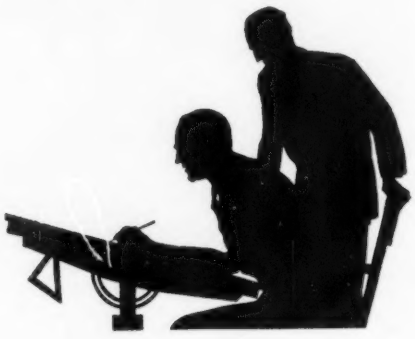
* * * * *

If Pete were asked, he'd probably say
"We're boosting production the Austin way."
Then he'd continue proving to you
Austin permissibles can boost yours too.

USED IN 1833 AUSTIN & EVER SINCE

AUSTIN POWDER COMPANY
CLEVELAND 13, OHIO

Better Education Is the Greatest Need Of the Coal Industry



"Civilization is a race between education and catastrophe." — H. G. Wells.

Civilized man has entered a new environment, an environment he scarcely dared dream of not long ago. The entrance into this new environment has man groping on the farthest fringes of his existing knowledge, for new ideas previously beyond his imagination.

Man cannot retreat from knowledge. The brain, which is primarily a by-product of civilization, is the greatest tool yet developed by nature in her evolution. Better education is the coal industry's primary need.

It is by visions of better working and living conditions that man makes positive effort. Survival problems in the coal industry have gone beyond the province of the practical mining engineer and entered the field of the scientist and the specialist.

The coal industry is sorely in need of someone endowed with insight to work the powers which advanced scientific research has put into our hands. Such insight should be so concerned that it will benefit all in the industry and not only a few who want to retard scientific advances to satisfy only their own personal desires.

Plan to use NEW FUELS to produce OLD FUELS

The use of atomic-age sources of heat to produce traditional fuels was suggested to a meeting of the American Institute of Chemical Engineers here by two Government engineers.

The use of nuclear reactors to supply the high temperatures needed to convert coal to gaseous and liquid fuels, was recommended by R. Carson Dalzell, chief of the branch of engineering development in the U.S. Atomic Energy Commission's Division of Reactor Development and James P. McGee, mechanical engineer in the U.S. Bureau of Mines' branch of coal gasification, Division of Solid Fuels Technology.

A drawback to commercial gasification of coal for use as fuel in other forms has been the cost of producing the necessary high temperatures. The Government engineers outlined a system that would call on nuclear reactor heat to gasify low-grade coal at 1,800 to 2,000 degree Fahrenheit and convert high grade coal at temperatures above 2,000 degrees. The resulting gas could be burned as fuel, or could be used to produce liquid fuels and chemicals.

The authors pointed out that experimental work by the Bureau of Mines has demonstrated the feasibility of gasifying finely powdered coal at high temperatures. They added that the equipment called for in their system probably would be perfected in the course of atomic energy development.

Hydraulic Attachments Increase Productivity and Usefulness of Bulldozers in Stripping

By CHARLES J. COOPER

Caterpillar Diesel D9 Tractor with tractor-mounted ripper and 9U Blade rips and bulldozes at same time on Fayette County strip job.

Earthmoving Consultant
Beckwith Machinery Company
Pittsburgh, Pennsylvania

Recent developments in hydraulic attachments have greatly increasedd the usefulness of tractors and bulldozers on stripping operations. Among the most productive of these attachments are the hydraulically-operated, tractor-mounted ripper and the hydraulic tilt attachment for the bulldozer blade. Job studies on a wide variety of stripping operations have shown definite advantages in time and cost savings, both in the removal of overburden and in the actual stripping of coal itself.

Tractor-drawn rippers have been accepted tools in the excavating business for many years. However, operational characteristics did not lend themselves very widely to use in the coal fields. The advent of the tractor mounted ripper has increased the advantages of this particular tool and presented new possibilities for wide-spread application in strip mines. Generally, these advantages include the following:

A) Ripper does not have to be detached from the tractor when it is not actually in use. The teeth are simply lifted up so that they will clear the ground and, in many cases, the added weight increases productivity of the tractor for doing jobs other than ripping, by increasing the traction of the machine.

B) The tractor is more maneuverable with this tool than with its predecessor—the drawn ripper. It can turn in confined spaces, reverse with ease, and there is no fear of turning it over as there was with the drawn model.

C) A much better job of ripping is now possible. Penetration of the tooth is increased over the old model due to the fact that a large measure of the tractor weight is added to the ripper tooth when it is being forced into the ground.

The second major attachment presenting greater production possibilities for the coal stripper is the hydraulic tilt attachment for bulldozer blade. Again, the tilt dozer principle is not a new one. For the past several years most bulldozer manufacturers have made it possible to tilt blades manually . . . that is, put the blade in position where one corner is lower than the other, by extending the bulldozer brace or push arm on one side and retracting it on the other. This was done by advancing the arms in and out. Now a hydraulic tilt mechanism eliminates all manual work connected with tilting the bulldozer (and, just as important, leveling it again), by substituting a hydraulic ram for one of the tilt arms. The blade can now be tilted in either direction by moving a lever within arm's reach of the operator.

Recently the weight and power of tractors available as stripping tools have been greatly increased. The combination of more weight and power, adaptation of hydraulic tilt dozer, and application of weight to the ripper teeth of tractor-mounted models, now makes it possible to break-up and doze away material with one machine doing the entire job. Previously, the same production would have required drilling, shooting and removal by other means. The question is: "What is this package tool worth to the stripping contractor and can it be used on every job?"

Hydraulic tilt bulldozer cutting out shale with no difficulty on stripping in Somerset County.

COST COMPARISONS . . . DRILLING AND SHOOTING VERSUS RIPPING

Of course, shooting costs can vary as much as anything else in the excavation or stripping business. They can easily be as expensive as 30 cents per cubic yard, using wagon drills and dynamite. On the other hand, they can be as low as a few cents a cubic yard by utilizing large rotary drills and introducing fertilizer for explosive charges. Obviously, the cost of drilling varies, depending on the hardness of rock and the speed of penetration of the drill. Bit costs alone can be expensive in extremely abrasive material, possibly approaching 3 cents per cubic yard for a large rotary drill working in adverse conditions.

Oddly enough, it does not necessarily follow that, if shooting costs are high on a particular site, ripping costs will be equally or relatively high. For example, drilling abrasive shale may be relatively slower and costly. The same shale may rip with little difficulty. Cost per cubic yard for ripping can hardly exceed 5.3 cents per cubic yard. This cost is calculated for the most adverse ripping conditions . . . material any harder to rip than that used to estimate these costs would not rip at all. This figure of 5.3 cents, therefore, becomes about the extreme high for estimating ripping. These costs were figured as follows:

CALCULATING RIPPING PRODUCTION UNDER THE MOST ADVERSE CONDITIONS

A) For the purpose of our illustration let us take a tractor with a first gear speed of 1.7 M.P.H.; assume the average ripping speed is only 1.0 M.P.H. or approximately 30 yards per minute.

B) Two outside ripper teeth of the tractor-mounted model are spaced approximately 2 yards apart assume one tooth in center rips only one yard of material in width.

C) Ripper tooth of the model under consideration can penetrate to a depth of 28 inches; assume it rips only 9 inches or 1/4 yard.

Ripping production, under these very conservative considerations, could be (a) 30 yards per minute, times (b) 1 yard wide, times (c) 1/4 yard deep, equalling 7½ cubic yards per minute.

Assume that the machine works for a 50 minute hour at nothing but ripping. The hourly production would be 50 minutes, times 7½ cubic yards

Hydraulic tilt cylinder replaces bulldozer brace. Note height of load over dozer blade, which is itself over five feet high.

per minute, equalling 375 cubic yards per hour.

The estimated hourly operating cost (itemized at the end of this article) is $19.98 for the most severe conditions. Therefore, the cost per cubic yard for ripping would be $19.98 divided by 375 cubic yards per hour, or 5.3 cents per cubic yard. Again, I would like to emphasize that the ripping cost cannot exceed this figure for, if ripping production were any less than shown, the machine would not rip at all.

It is important to note that most rippable materials will break up at a much faster rate than the extreme estimate shown above. The average cost per cubic yard for ripping is probably less than 1 cent per cubic yard!

RIPPING INCREASES USEFULNESS OF DOZER

The impression may be given that, providing overburden is rippable, a tractor equipped with bulldozer and tractor-mounted ripper is going to replace all drilling and shooting, as well as shovels and draglines. This is **not** necessarily true. There are few sites where a bulldozer can do the complete stripping job. Usually, unless cover is quite low, push distances for a bulldozer operating alone are extended beyond the most economical dozing range.

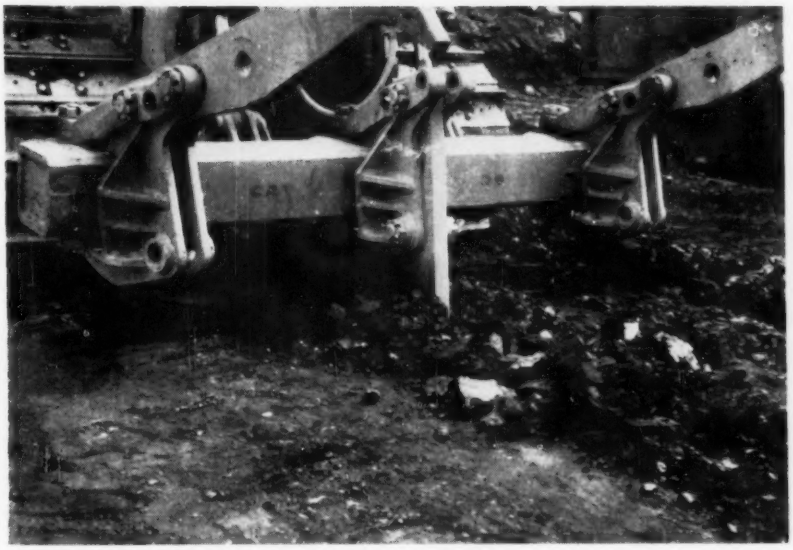
The entire job of stripping is being done with a Cat D9 tractor, equipped with ripper and tiltdozer at the mine of Svonavec Brothers Coal Co. of Listie, Pa. This amount of coal, partially covered with snow, was uncovered in five one-shift working days. The linear distance is about 300 feet.

It has been a generally recognized fact that application of bulldozers for cutting down ahead of shovels or draglines produces the least expensive yard of dirt, providing depth of cut is controlled so that dozing distances are not too far extended. However, it should also be recognized that this situation has changed in the past few years. Tractors are available which double the bulldozing production of those previously used in the stripping field, but do not double the operating cost nor double the initial investment. In the past few years the surprisingly low cost per yard of dirt moved by new large dozers has been proved many times. For example, it was brought to light in one case by a production study on the operation of William Piccolomini of Connellsville, Pennsylvania.

Shown above are pieces of sand rock taken out in one pass of a Caterpillar No. 9 Ripper. The sand rock was not thick, but it is questionable if this company could have made full use of the bulldozer advantages without the availability of the ripper.

BULLDOZING ITSELF IS MORE ECONOMICAL TODAY THAN THREE YEARS AGO

On this Western Pennsylvania job, a Caterpillar diesel D8 bulldozer and a Cat D9 bulldozer, similarly equipped, were being used to cut down overburden ahead of a 2½ yard high-front stripping shovel. Cross



Availability of this ripper on the job saved 15 cents a ton coal shooting costs for this Fayette County stripper.

sections of the stripping property, as well as time studies of tractor production, proved that the D9 machine was doing more than twice the work of the widely-used Cat D8, previously acclaimed by many as the standard stripping dozer. The average blade load for the D8 was 4.55 cubic bank yards compared to 9.61 cubic bank yards for the D9. The average hourly production for the same length of push for these machines was 242 bank yards for the D8 as compared to 512 bank yards for the D9.

Most important, it was determined that the D9 could push material up to a distance of approximately 325 feet as compared to approximately 200 for the D8, before the cost per cubic yard of bulldozer dirt exceeded cost per cubic yard of material handled by the stripping shovel. The extended economical push distance really means an increased economical depth of cut taken with the bulldozer and the end result is either increased production, lower cost per ton, or both.

RIPPER MAKES BULLDOZER BONUS AVAILABLE

Of course, it has not always been possible to take a deeper cut with the bulldozer because of the nature of overburden encountered. This is where the ripper comes into the picture. Many times the material encountered below the surface, which is too difficult for the dozer alone, can be ripped and dozing continued. Use of the tractor-mounted ripper therefore increases the usefulness of the dozer above its already highly productive application.

Production study was made on the job of Moon and Son, also of Connellsville, Pennsylvania, where this situation was taking place. Shale and rotten sandstone were encountered a few feet below the dirt surface. Instead of losing time and increasing costs because of restricted bulldozer activity, bulldozing production at this pit was only slightly affected negatively because the operator has a tractor-mounted ripper to break up this material. Large blade loads could therefore be obtained and the work done by the bulldozer itself remained more nearly constant with normal operation. A cross section and time study was made of this particular machine. During the study it made a total of 54 bulldozing passes. Of these, 25 passes were with the ripper in the ground. For an average 82 foot push distance, it moved a total of 788 cubic bank yards at an estimated cost of 3 cents per yard. The average load pushed by the U-shaped bulldozer blade was 14.6 cubic bank yards.

HYDRALIC ATTACHMENTS INCREASE POSSIBILITY OF BULLDOZING DOING ENTIRE STRIPPING JOB

There are occasions when the tractor-mounted ripper and tilt dozer are not effective enough in breaking up and removing hard material. Standard stripping methods must be used in such cases. However, when the ripper will work, there is usually the chance of effecting large savings in the stripping operation, especially when a tilt dozer is also mounted on the tracctor.

A situation where these conditions exist is at the operation of Svonavec Brothers Coal Company of Listie, Pennsylvania. This company has only about 24 feet of overburden on one piece of coal. It is using a bulldozer equipped with both ripper and tilt dozer to do the complete stripping job. A cross section and time study of the machine was run here and production was determined as follows:

For the first 12 feet the material encountered was frost, dirt and shale. The frost offered no resistance to the tilted bulldozer blade. The dozing grade was most favorable, the material was easily dug with the slot-dozing method. Tilt mechanism was utilized to produce maximum blade loads and an average of 14.3 cubic bank yards was removed per pass of the dozer.

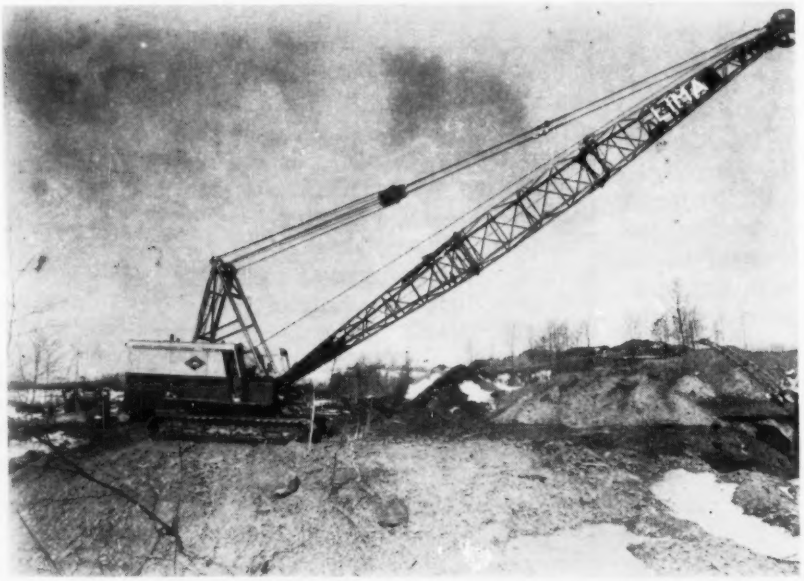
On the next 8 feet, material was mostly shale with some soft sandstone The favorable dozing grade was decreased but the tilt dozer was used to root out obstinate material. The average blade load was 11.3 bank yards. The remaining four feet of overburden consisted of hard shale with a rather thin layer of sandstone less than one foot thick. Here the tractor-mounted ripper came into action. Favorable dozing grade was lost and the average blade loads were reduced to 7.5 bank yards.

The Svonavec operation is a case where one machine can be used to do the entire stripping job. Without

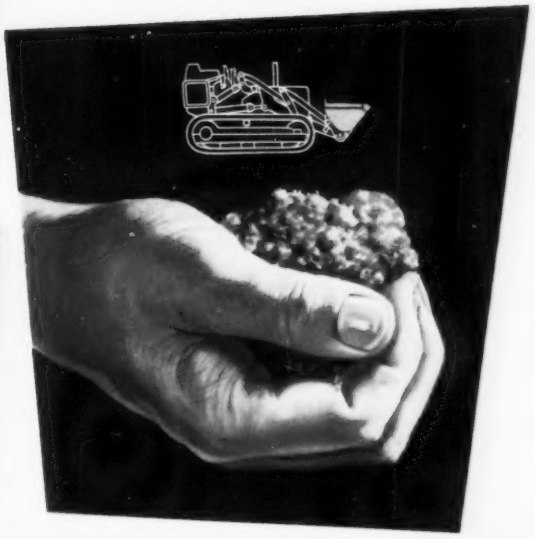
(Continued on Page 32)

New
Lima Model 1250 Dragline
Stripping at
Thermal Coal Co.

Recovering the "D" seam of coal running from 32 to 34 inches thick in Somerset County Pennsylvania, the Thermal Coal Company is using one of the new Model 1250 Lima draglines to more up to 35 feet of overburden. The boom on this dragline is 80 feet long and it handles a four cubic yard bucket. Brush clearing and other general tractor work is done with a Caterpillar D-8 tractor. Overburden consists of a six foot layer of rock directly on the coal seam, then blue shale and top soil. Thee layer of rock is drilled with a new McCarthy 6 inch drill for shooting. The surface of the coal is cleaned with hand shovels then swept with a mechanical sweeper. Loading of the coal is done with a 3/4 yard dipper.



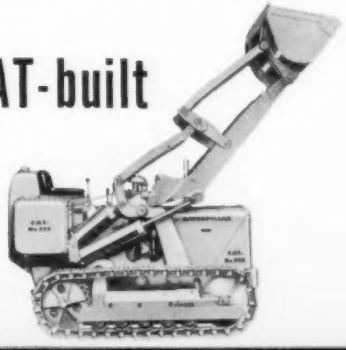
The new Lima Model 1250 dragline moving overburden.



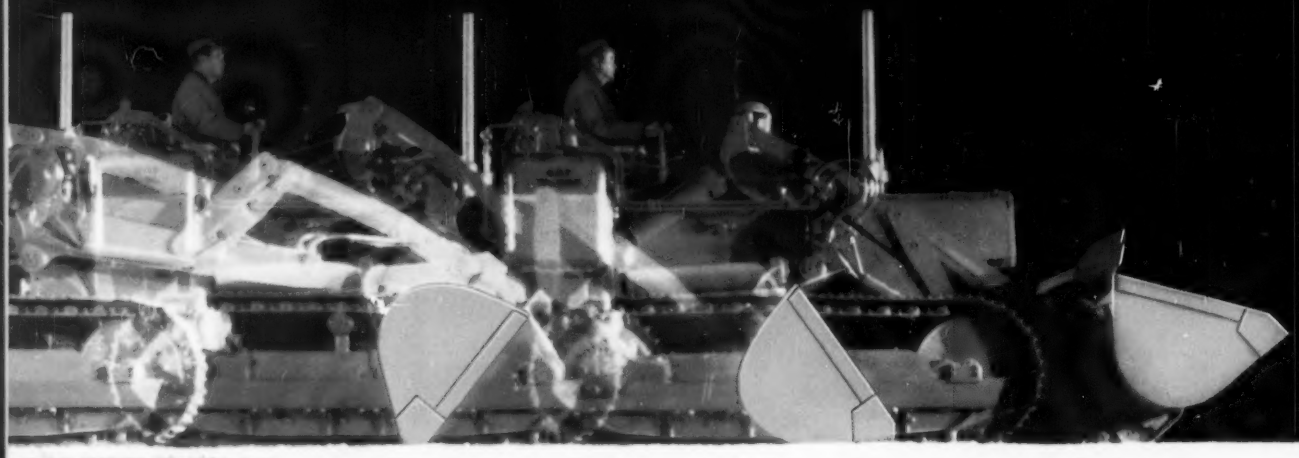
SEE IT NOW...

the mechanical hand and wrist action

exclusive with CAT-built TRAXCAVATORS



YOUR CATERPILLAR DEALER WILL SHOW YOU THE EXCLUSIVE TRAXCAVATOR*



Get that feel of Traxcavator power and speed in the stop-action photograph shown here? Add to it the right balance of power, capacity, toughness and maneuverability: this is what it takes to move dirt for *pennies* per yard! This is what you get with Cat-built Traxcavators! Take a look at these features—then call your Caterpillar Dealer. Have him demonstrate the size you need on *your* job. Check its performance. Time it. Compare it with any other materials handler. *You* be the judge!

Action for GRADING, DOZING

From shovel to bulldozer *in seconds!* With a multi-purpose Traxcavator, just tilt the bucket to dozing position. Perfect for small jobs of backfilling, grading, spreading, clean-up work.

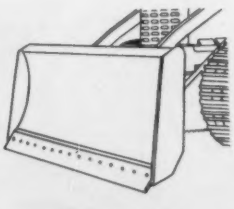
Action for FAST DIGGING

You want fast digging—that's a Traxcavator specialty! Designed specifically as excavating-loading machines, they are rugged and powerful, with many features that increase productivity. Bucket indicator aids the operator in accurate control of the bucket. Exclusive oil clutch practically eliminates clutch adjustment—metallic plates are separated by oil film until last few revolutions before engagement, preventing overheating, eliminating clutch fade. Hydraulic system permits bucket to float, lower, hold or raise.

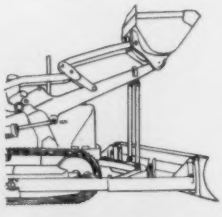
Action to CROWD AND CARRY HEAPED LOADS

40° tilt-back at ground level gives powerful pry-out action . . . prevents spillage. Move just one lever and

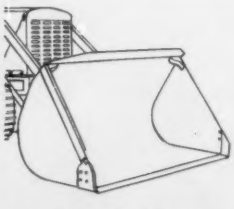
MATCHED CAT* EQUIPMENT TO INCREASE TRAXCAVATOR VERSATILITY



Straight Blade

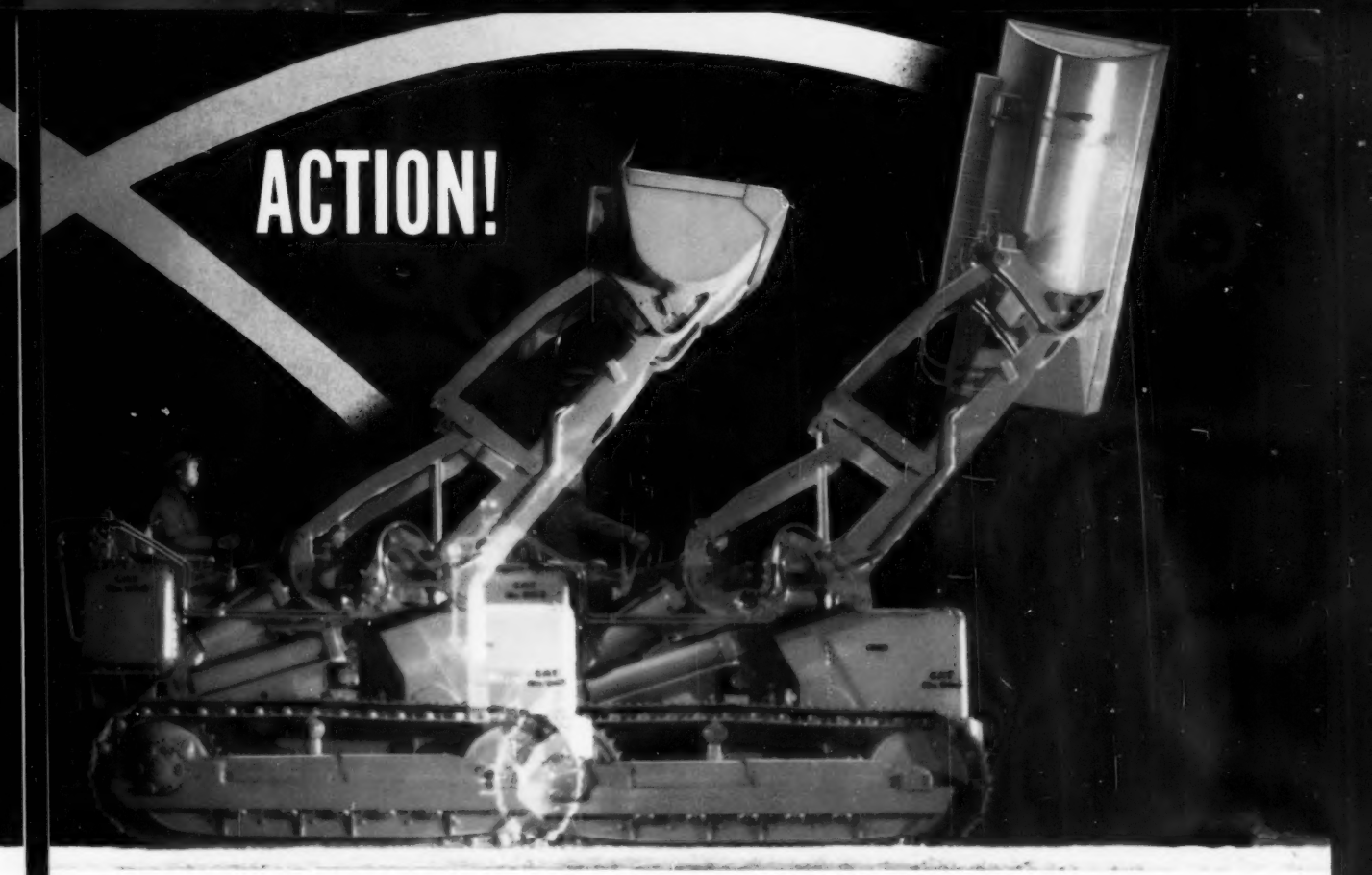


Angling Bulldozer



Light Material Bucket

3 CATERPILLAR DIESEL TRAXCAVATOR SIZES



the cutting edge is tilted back to crowd and carry a heaped load. This same action provides tremendous break-away power for prying heavy, hard-to-manage materials, such as boulders, concrete and stumps.

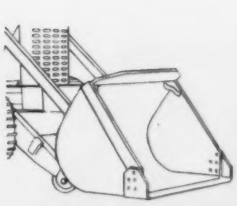
Action for FAST LIFTING AND DUMPING

More reasons why Traxcavators are the fastest loader-excavators in their class: Powerful hydraulic system raises bucket quickly; system operates whenever the engine is running and is independent of the clutch. Automatic bucket leveler is standard on all Traxcavators. It automatically moves the bucket from dump position to dig position—freeing both hands for operation of the Traxcavator, speeding production and reducing operator fatigue. Fast shift transmission increases operator efficiency and saves time. Traxcavators are easy to service—for example, a cluster of grease fittings leads to the clutch release bearings and control lever shaft bearings. There are no lubricating points under the Traxcavator. These are but a few of the many extra values you get in Traxcavators.

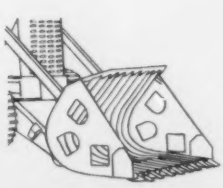
Action for SIDE DUMPING

New Side Dump Buckets are exclusive attachments for Caterpillar* No. 955 and No. 933 Traxcavators . . . attachments that add more versatility. Here's why—they simplify maneuvering, eliminate turning to load, straight forward and reverse travel reduces cycle time, permits either left or forward dumping. Modern design bucket dumps quickly and cleanly. Bucket capacity for the No. 955 is 1⅝ cu. yd., and for the No. 933, 1⅛ cu. yd. See one in action today!

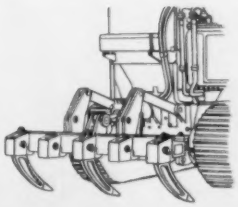
*Caterpillar, Cat and Traxcavator are Registered Trademarks of Caterpillar Tractor Co.



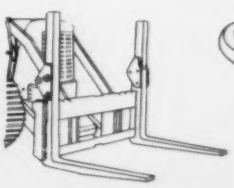
Heavy-Duty Bucket



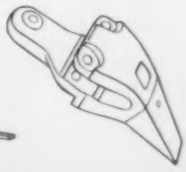
Skeleton Rock Bucket



Rippers



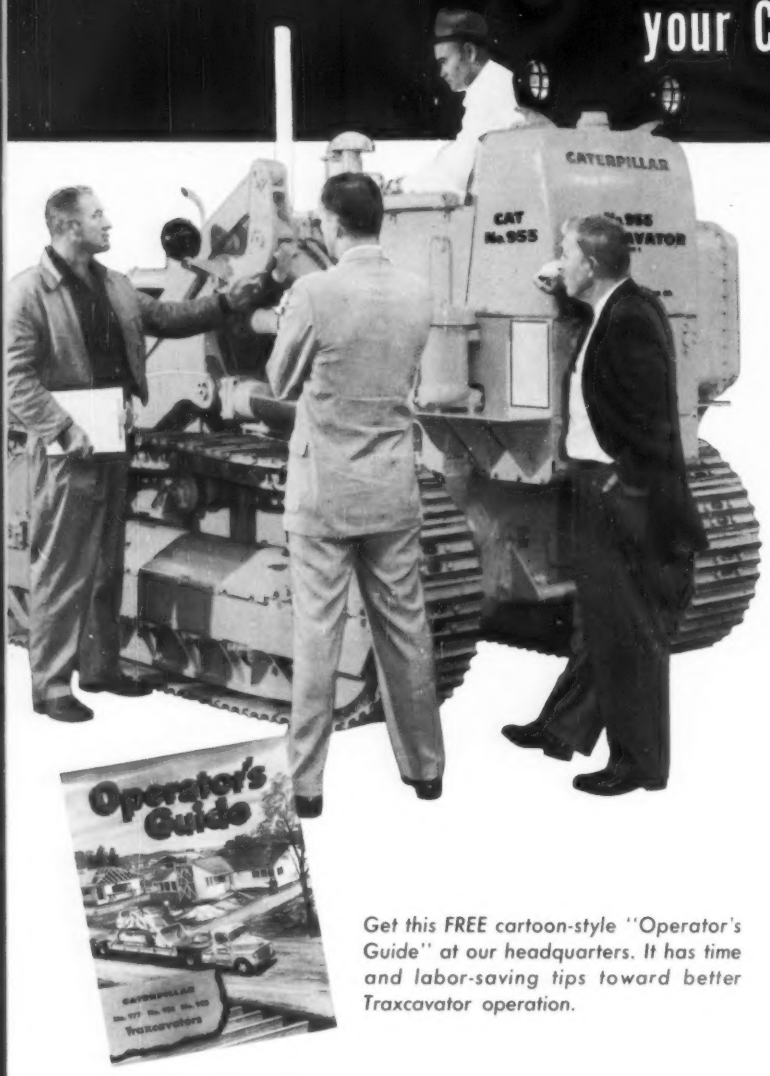
Log and Lumber Fork



Bucket Teeth

designed to out-produce anything in their class!

The SALES-SERVICE-PARTS team behind your Cat-built TRAXCAVATOR



Get this FREE cartoon-style "Operator's Guide" at our headquarters. It has time and labor-saving tips toward better Traxcavator operation.

When you take delivery on a Caterpillar-built Traxcavator, you're doubly sure of getting all the production and performance promised. First, you have the most versatile, efficient and rugged loader-excavator in the construction field. Let us demonstrate the Traxcavator and equipment to match your terrain—your materials—your applications.

Next, you've automatically "retained" the services of our sales-service-parts team. Though it's your machine, it's our responsibility to help you get maximum efficiency and production from it. Our men are factory-trained to handle service and parts problems quickly and efficiently. Parts stocks are ample to fill your orders promptly. And, we have the facilities—modern shops, specialized tools, well-equipped service trucks—to handle all your service needs, large or small—on your job or in our shop.

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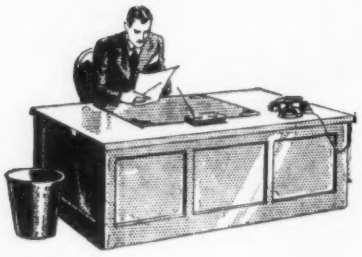
Looking into the pit, showing men and cleaning the surface of stripped coal and the coal loading shovel.

The Caterpillar D-8 tractor making road bed for the dragline.

This McCarthy drill makes blast holes in rock overlaying the coal seam.



WHEN SHALL WE REPLACE THAT EQUIPMENT?

By ERNEST W. FAIR

The decision as to when any given piece of equipment in a coal firm is to be replaced is never an easy one to make. If we replace too soon we are throwing capital dollars of the company out of the window while if we wait too long we are wasting profits which can do irreparable harm to our business.

Haphazard replacement of equipment or doing it by guesswork are never good procedures. Every coal firm equipment replacement program should have a definite plan of procedure not only to protect the financial security of the firm but to make certain the proper step is being taken at that specific time.

There are a number of very important factors we should take into consideration in the process of making such a replacement decision. From a number of successful coal firm executives, equipment engineers and other experts, we've compiled the following list of factors which should be weighed whenever and wherever the company executive decides a specific unit of equipment may need replacement. They are sure dollar savers and profit makers.

Is the present equipment worn out?—Discarding present equipment far in advance of its actual decline is needless waste. On the other hand any attempt to "squeeze out" a few more additional runs from an obviously worn out piece of equipment is seldom wise procedure. There is no greater waste of budget dollars in any coal firm than attempts to continue use of worn out equipment.

Test runs in use of such units and comparing these with performance capabilities of six months or a year past is one method of finding the answer. Another is to discuss this factor with the men who work with the particular machine day in and day out.

It is also good procedure, when arriving at a decision as to whether or not such a unit needs replacement, to consider the high payroll cost involved in using such worn out machinery. At today's wage levels the difference can soon repay the cost of a new unit.

Is the machine obsolete?—As each month goes by in the coal industry competition becomes more rugged. It will probably be greater in the future than it is today. The firm with the most modern and up-to-date equipment capable of getting the job done at lowest cost will be the one getting the business. That firm will never be able to do so with the use of any obsolete equipment.

Almost without exception advancements in coal machinery engineering have made it possible not only to produce greater runs in less time but do work never before possible. No firm will be able to survive competition in the future attempting to buck such trends with old and obsolete equipment.

Is it inadequate?—This factor embraces a number of specific points which should be closely scrutinized. These cover the capability or incapability of the particular piece of equipment insofar as these points are concerned: (a) Range or size of work that can be done. (b) Speed of operation. As wages go higher production per hour becomes more and more important. (c) Accuracy or degree of finess of work—we can no longer do business on a "get by" basis if we hope to survive in the future. (d) Rate of output—machines are like we human beings, i. e., the older we get the more we slow down. In neither machines nor humans is this readily apparent—it slowly accumulates over the years. Only by closely checking can we determine just how much such a machine has actually slowed down.

Does it fit in with other new machines?—Complete equipment replacement is a rarity in the coal industry. The usual procedure is replacement of one or two machines

at a time and these steps taking place over a considerable period.

This means that units of equipment in the average plant have varying ages AND varying degrees of efficiency. In many an instance this may be the most important factor we have to consider in deciding whether or not to replace a specific machine — have other replacements made it so inefficient that it is actually holding back the productive ability of these other newer machines?

Can its work be done better by some new invention?—With some particular types of older coal industry equipment new inventions have so obsoleted their function that a replacement in itself would be wise. In some instances the value of these new inventions to our individual firm is so great it may pay to scrap this particular unit entirely.

Does it lack worthwhile new features?—In many instances the lack of certain such features may be justifiable cause for an immediate replacement of a unit. This includes such things as the lack of controls, special attachments and safety features or newer units similar to the one under consideration.

Will a new machine do other work?—Another point it may pay us to give considerable study is whether or not a new machine can not only perform the work being done now by the one under consideration but also other kinds of work which the present machine cannot handle. If the answer is a very definite "Yes" replacement may be in order even though the useful life of the present piece of equipment is far from used up.

Can the new machine replace hand operations?—There is no longer any such thing as low cost labor. The old days where it was cheaper to perform certain operations by hand than by machine are gone or going fast in every phase of the coal industry. There is virtually no chance whatever of this changing in the future (in fact labor costs are apt to continue to rise) so wherever this possibility is present a new equipment purchase may be definitely in order.

Does the new machine have special advantages? — Each of these should be given most careful consideration as they affect costs in our organization (and profits, of course). Some items which might be taken into account: (1) Ease of set up. (2) Convenience of operation. (3) Safety, such as guards, stop buttons, etc. (4) Reliability in performance.

Is the cost of keeping present equipment in repair too high?—If we keep good accounting records we can readily determine when such maintenance and repair costs are becoming too high to justify further use of a particular piece of equipment. If not then the chances are that we may well be wasting profit-dollars through retention of present equipment beyond the time when it should be replaced. This is always a most important factor in determining whether or not a particular unit of equipment should be replaced.

Will spoiled job cost be reduced by machine replacement?—Here is a frequently overlooked factor. Old, worn and tired machines always have a tendency to increase production costs through ruined or spoiled work.

Will faster rate of production be worthwhile?—Where the firm has a good volume of business on long runs this is always worth weighing in balance. Almost without exception newer equipment gives a faster rate of production than older equipment. Where the bulk of work does not justify this factor it is of course of less importance than in a highly competitive situation based on long runs and big jobs.

Can two or more existing machines be replaced by one new one?—In some instances (particularly where equipment may be exceptionally old) this is also an important factor. It pays to make a close study of the machine availabilities to determine whether or not this important factor should be one well worth our consideration.

How are maintenance costs?—In many instances maintenance costs on new equipment, through improved machine design, are so low that the difference between them and those we are now expending on the old equipment can actually pay for the replacement costs. Usually manufacturers have reliable data on this point; if we are skeptical it will pay us to check with some other firm now using the equipment we have under consideration for their maintenance experience.

What about floor space?—In these days floor space is becoming of more and more importance as building costs skyrocket. Usually new equipment has been designed to occupy far less space than comparable older units. This may mean we can obtain additional space for other equipment we have been needing and for which there is no room at present available. It alone may justify immediate replacement of the old unit.

Are funds available?—Often the financial angle of a new machine purchase may be most important. If funds are available then it is not a problem. However if we must finance the purchase tthen this additional cost should be considered. If this factor should also be one given much thought. Usually the canditions will have to be to extreme for the advantages to be obtained through purchase of the new equipment will in great measure offset any such increased costs.

Each of the foregoing factors are important in consideration of when any unit of equipment in the firm is to be replaced. Overlooking even one may bring about an unwise decision on our part. Old and worn equipment always increases cost of production on any type of job. When these increases rise to a too sharp peak failure to make equipment replacement can often endanger the future security of the business.

Saving Evergreen Shrubs and Trees on Stripping Operations

In coal stripping evergreens are generally thought of as trees planted to rehabilitate stripped land. Too often evergreens on the land before it has been stripped are moved with the spoil without regard to their value. This is often true when stripping established farm land on which a sizeable residence has been established and the land around it has been planted in evergreens that have grown into stately and beautiful specimens of their kind. The destruction of such majestic work of nature is a crime against mother earth. Looking into the possibility of salvaging some of these monuments of plant life which can be moved to improve land around offices, homes, churches, schools, playgrounds or communities, it was found that persons with knowledge of transplanting them were very few in number and that their idea of how and when to transplant as well as how much it would cost, varied considerably.

Realizing that at a stripping operation everything on the surface must be moved when encountered, regardless of the season of the year, COAL MINING last summer undertook an experiment in transplanting in all seasons. The first tree moved was a 20 ft. Hemlock early in the spring which was given only the average care of watering during the hot summer weather. This tree is doing well which it should do since it was transplanted according to established rules.

Next we tackled the job of moving 10 evergreens including 6 Arbovitea ranging from 6 to 12 feet high, 3 Norwegian Spruces, two running 10 feet high and one 30 feet high and a Blackhill Spruce running 15 ft. high and 15 ft. wide. This job was undertaken last June at the beginning of the worst dry spell in recorded history in this area. The dry spell has been on long enough to make the earth around the tree balls dry so the difficulty of balling was increased as well as the possibility of loosing the ball in transport. The smaller spruces, the Arbovitae

The Blackhills Spruce in its new location. Despite the 90 degree heat with no rain for more than 6 weeks it looks very much alive. Food was given when planting and it was watered from 4 to 10 times each day. Note the Norway Spruce on right of building.

This 35 foot Colorado Spruce was loaded with platform under the ball. Note the ball is broken in the middle and the tree is resting on its lower branches. Unloading this tree almost all the soil around the ball was lost and the weight broke many of the larger root system when it was uprighted. The nurseryman was given a day off to check with the hauler about platform under this tree. No check with the trucker was made and no platform came with the truck which is the reason for the broken ball. Beside, the guy ropes used were too light and this tree was blown down two times. Despite all this knocking around it looks like it might grow.

The Norway Spruce after 6 weeks in its new location. Note water hole suspended from roof of building. Water was sprayed constantly for 4 weeks, then from 4 to 10 times a day for 3 more weeks.

and the Blackhills Spruce got moved satisfactorily. The 30 foot Spruce, being much taller and heavier, required some knowledge of this work, knowledge that our nurseryman did not have, gave us trouble. The so called nurseryman further demonstrated his ignorance by letting this big tree drop from the bed of his truck while placing it in its new location, which completely broke the ball. Placing this tree we hand packed the loose root with peat moss, guyed it down, distributed 30 lbs. of dry nitrogen around the roots, placed a water hose over the tree from the roof of the house near which it planted and sprayed water on it day and night for 3 weeks. The other plants were watered from 4 to 8 times a day in the dry spell and were kept watered well into the fall season. At the time of this writing (the following spring) all the Spruces look alive. Two Arbovitae look dead.

Last October we transplanted three 12 foot high Colorado Blue Spruce trees. This time very little effort was made to get a ball around the roots. Some work on the roots of these trees was done but the roots were pulled loose by a pick-up truck which transported them about 35 miles and they were replaced in about 2 hours. These three trees

This truck crane lifted the Blackhills Spruce on and off a regular type truck. The ball was 74 inches wide and was on a 4-foot square stell platform. This tree handled satisfactorily but the cost was much too great.

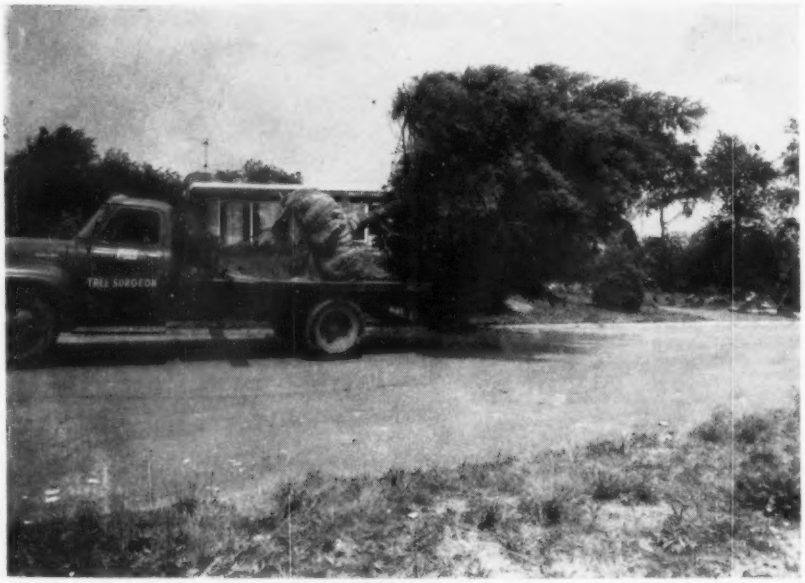
were watered well and fed evergreen plant food twice before cold weather set in. This spring they look very much alive.

Last November we undertook the task of moving four 30 to 35 foot high Colorado Blue Spruces. All nursery recommended precautions were followed in this work which consisted of carefully balling the required root system and waiting for freezing weather before transporting. Moving the first of these big trees we soon learned that the nurseryman we hired did not know his "stuff" and got "fired". We hired another nurseryman with a 10-ton, 4-wheel drive truck equipped with a winch which was supposed to be enough to move those trees easily.

After about 10 days of labor (consisting mostly of unnecessary maneuvering to deliberately run up the costts) two trees were moved and this man was "fired". Having had two experiences with advertised so called the movers who misrepresented themselves, we called in an old established nursery which had the kind of platform on which balled trees should be moved, we hired an 18 foot long low trailer truck with big enough winch to do the job and got the last tree moved on a satisfactory basis.

The things we learned about moving big trees and shrubs is this:

You can move large shrubs and trees anytime of the year if you do it properly. In growing seasons you must water the transplants constantly until their root system get reestablished. Power shovels and tractors on strip operations permit balling and lifting at practically no extra cost. Excavations at the transplant area run from 5 feet in diameter by 3 or more feet deep to 11 feet in diameter by 4 feet deep. These should be ready before the plants are moved. Good soil and plant food should be on hand for replanting. Water supply should be ready as well as substantial pegs and strong guy wire to fasten the plants down.



This 30 foot high Norway Spruce has the 4 foot square steel platform under it and was pulled onto this truck with hand operated half-ton come-a-long jack. This ball has been loosened considerably in getting it on the truck, then the tree fell off this truck in our effort to place it in its new hole. As can be seen the back end of this should have been jacked to hold it level when the weight was pulled to the end of the body. Not having been jacked the weight shifted to one corner unbalancing the body and the tree fell off loosening the ball more than it had been loosened. Luckily it fell near the hole and we were able to place it by twisting the body of the tree.

The 3-12 foot Colorado Blue Spruces placed to act as wind break as well as screen for the building.

Overall view of the land decorated with Evergreens.

Two large Colorado Blue Spruces that have been placed at the upper end of the property. The one on the left had been very badly handled in transport and was blown over 2 times. It looks like it will grow despite all the bad treatment it got.

Two large Colorado Blue Spruces that have been placed at the lower end of the property.

Guy the plant down immediately, soak with water thoroughly.

It is my opinion that in the dormant period of plant growth any plant can be moved by taking enough bare root and provided the plant can be handled and suspended in the air while replanting to allow repacking of the soil around the roots to keep the weight of the plant from crushing the root system. This means that in about four months in the year you could beat the root system pretty badly with a power shovel or tractor and still transplant it if you did not break too many branches in moving.

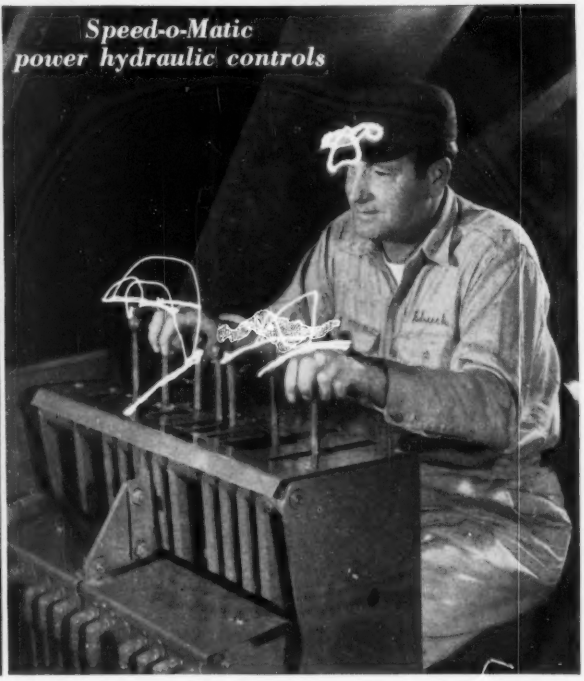
The secret in making transplanted plants grow is in the care you take of them afterward. In transplanting the lifeline of the plants is disturbed and reduced. Compensation for the reduced lifeline must be made through proper watering, feeding and guying down to hold the plant steady. Watering is very important and too much water cannot be given the first season as evergreens will live in water only for a whole year. The second year is very critical as people think a plant is established and stop watering whereas the plant needs to be watched more than ever because it has lived the first year on much of the energy stored in plant before transplanting and now must rely for food on its root system which has been reduced in transplanting. Supply the plant with plenty food and enough water. After your plants are established, their appearance will depend on the care you give them.

This 3-hp tractor with digging attachments was used to dig holes for replanting. The dark area in this hole is a seam of coal.

Time-light camera shows!

Which shovel-crane produces more ?

Follow the light lines. They show the "long reach" moves an operator makes with conventional controls to complete a hoe cycle, then shift from swing to travel, steer right and left and shift back from travel to swing. (Operator makes similar moves in shovel or dragline work). Such "arm's-length" work with slow mechanical or booster systems adds seconds to every move, drains operator strength, cuts end-of-the-shift output.



No reaching, no yanking . . . just easy, "keyboard" operation with Speed-o-Matic controls and Independent-Swing-and-Travel when performing the same operations as the hoe with conventional controls. Operator moves hands and fingers, not his whole body. Short-throw levers speed cycles, up output, conserve operator strength. Ask the man who has worked both controls. He'll pick Speed-o-Matic every time!

Speed-o-Matic power hydraulic controls increase output by decreasing cycle time and reducing operator fatigue

Pushing a shovel-crane at its highest limit all shift long is easy with Speed-o-Matic power-hydraulic controls.

And Speed-o-Matic—standard on all Link-Belt Speeder shovel-cranes—is the original fingertip, flick-of-the-wrist system.

Hydraulic pressure assures the same fast, smooth response *all day,* without adjustments . . . and with perfect feel of the load at every lever position.

And Speed-o-Matic power-hydraulic controls are only one of the many Link-Belt Speeder advantages. Others include—

- GREATER USABLE HORSEPOWER
- FULL-FUNCTION DESIGN tailors the machine to the job . . . permits more standard and optional features such as Independent-Swing-and-Travel.
- BONUS CRANE CAPACITY when using long booms at extended radii.

For complete details on why your best shovel-crane investment is a Link-Belt Speeder, contact your distributor or write LINK-BELT SPEEDER CORP., Dept. CM-458, Cedar Rapids, Iowa, for book 2553.

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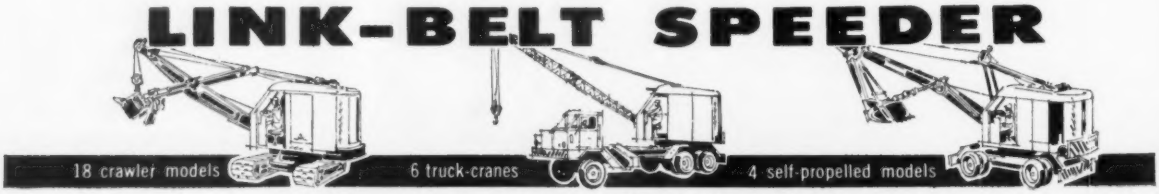

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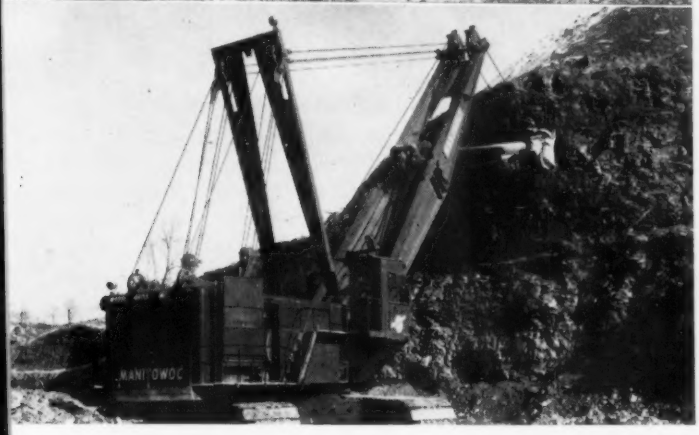

Think of coal stripping and you naturally think of Manitowoc. Why? Because Manitowoc has proved itself the most practical, productive machine in the field. See it work — ask any owner, and like these men, you'll find that there's a perfect spot for Manitowoc in your stripping operation.

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BROWNING
McCAFFREY RUDDOCK

HYDRAULIC ATTACHMENTS INCREASE PRODUCTION AND USEFULNESS OF BULLDOZERS IN STRIPPING

(Continued from Page 17)

the tilt dozer and tractor-mounted ripper it would probably not be possible. At least it would only be done at a greatly decreased production rate and at increased cost.

For those strip operators who are considering a large tractor, equipped with the tractor-mounted ripper and blade device, an estimated hourly operating cost follows as a guide. To determine hourly operating costs, it is necessary to assemble certain pertinent data. In this example we shall assume the most servere conditions possible with all costs estimated extremely high. This particular formula should only be considered as applying when the tractor is ripping, since hourly operating costs for a tractor which is dozing only would be materially lessened.

If an approximate replacement cost of $59,500 is assumed for the tractor, ripper and hydraulic tilt bulldozer, we can also make a very severe estimate of the depreciation period as two years or 8000 hours. The approximate fuel consumption would approach 12 gallons per hour and approximate lube oil consumption would be about .18 gallons per hour. It is also necessary to establish a figure for repairs and maintenance in order to give a well-rounded picture on hourly operating costs. To be extremely conservative, it is assumed that repairs will equal depreciation or, that in 2 years of operation, an amount equal to the original cost of the machine would be required for maintenance. (It is highly questionable if this condition could ever actually exist).

Based on all of these assumptions, the estimated hourly operating cost can be worked out as follows:

ESTIMATED HOURLY OPERATING COST UNDER SEVERE CONDITIONS OF OPERATION

	Per Hour
Depreciation	$7.45
Interest * (6% on average investment)	.45*
Insurance (6c per $1000 per year)	.09
Fuel (15c per gallon)	1.80
Repairs and Maintenance (same as Depreciation)	7.45
Lube Oil ($1.00 per gallon)	.18
Gasoline (Start and Clean)	.03
Filters	.02
Grease	.01
Operator (estimated)	2.50
Total:	$19.98

for large tractor, tractor-mounted ripper and hydraulically tilted bulldozer.

* Assume owner is either paying interest or would receive interest if money was invested elsewhere.

SUMMARY

New models of larger, higher powered tractors have increased production possibilities of the bulldozer as a stripping tool. In some cases, under advantageous operating conditions, a tractor equipped with tractor-mounted ripper and tilt blade hydraulically operated, can profitably handle a stripping operation alone. Under other conditions, a large tractor with ripper and hydraulically operated tilt blade, can increase production, reduce costs, or both, in conjunction with a shovel or dragline.

It is acknowledged that there are conditions where a ripper and dozer will not produce satisfactorily and drilling and blasting must still be employed. However, consideration of a heavy tractor, equipped as described in this article, is recommended, based on the probability that such a package will yield higher coal production with lower cost than present methods.

● Major advances in design of the Allis-Chalmers HD-21 turbocharged diesel powered tractor are described in the two-color, 16-page catalog (MS-1243) now available from the Construction Machinery Division, Allis-Chalmers Manufacturing Co., Milwaukee, Wis. Photographs and other illustrations point to these features and help tell the engineering and construction story of the tractor. Matched equipment and the line of accessories for the HD-21 are also pictured. Tractor specifications are included.

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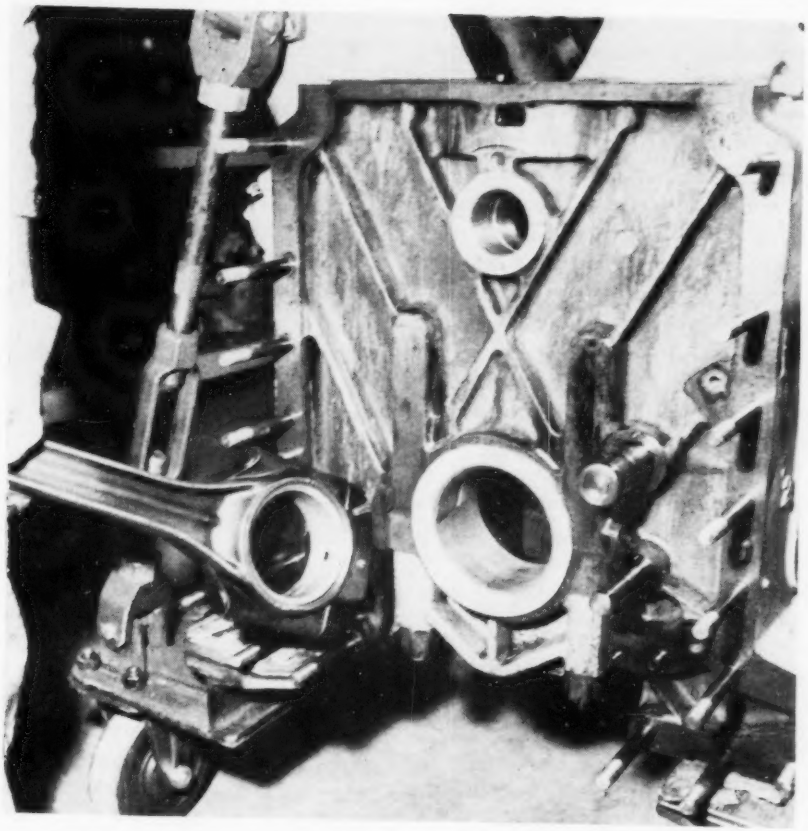


Close-up shot shows condition of aluminum bearing in Cat D364 Diesel Engine after 250,000 hours of operation. Regular service resulted in long life. The engine was put back into service with only new piston rings, as parts still registered within wear limits. One of 40 at a large South Carolina industrial plant, the engine was installed in 1952.

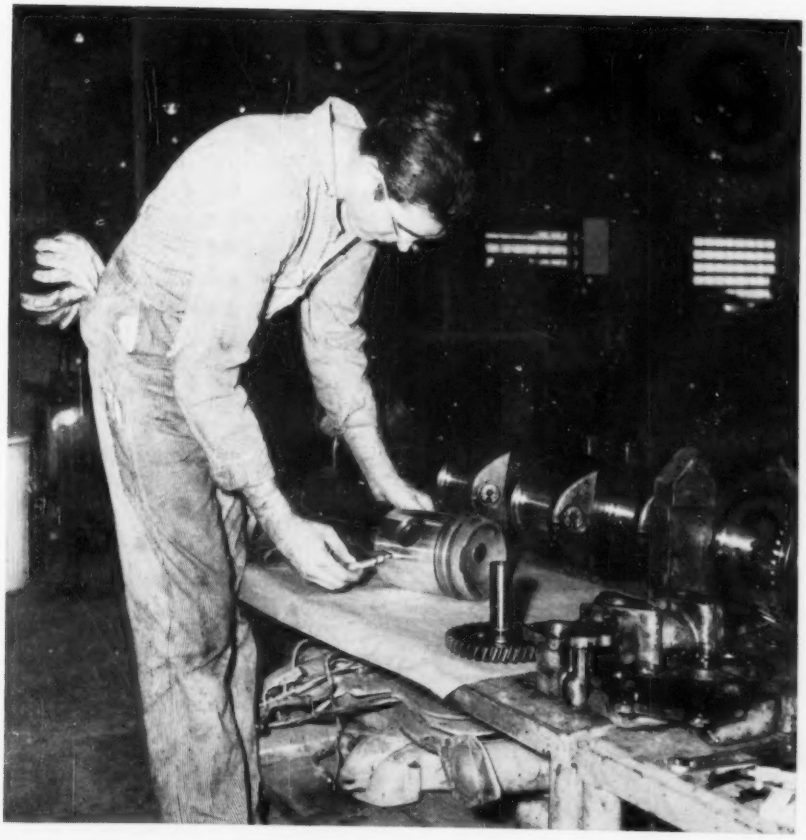
Often preached and only sometimes practiced, regular service and maintenance may mean the difference in a long or short life for a diesel engine. Dramatically underscoring this fact is the experience of a large manufacturing plant in South Carolina. There, a diesel engine, operated for 25,000 clock hours (equal to 625,000 miles in an auto at 25 miles per hour) on an inspection showed so little wear that parts replacement was limited to piston rings.

One of 40 Caterpillar D364 Diesel Engines used to generate electricity for experiments at the plant, the unit was installed in January, 1952. The 40 engines are run in banks of four, with each getting one week in four off for servicing. In this manner, each engine runs 24 hours per day, three out of four weeks, 12 months a year.

Due to the importance of dependable, continuing operation in the plant's work, the engines are kept in top performing condition at all times. Regular service schedules, as supplied by Caterpillar, are observed and maintenance performed on call from the operating group. At regular intervals, oil is changed, using the grade and weight specified by the manufacturer.

When the engines began approaching 25,000 hours in November of 1957, the plant's equipment maintenance division decided to disassemble one engine to investigate wear and need for overhaul or replacement of parts. As each part was removed, it was carefully check-

(Continued on Page 35)



After 25,000 clock hours operation, pistons of CatD364 Diesel Engine still measure well within manufacturer's wear limits. Regular servicing on schedule helped keep this engine running longer than expected. After careful checking, the engine was put back into operation without major parts replacement.

WHAT YOU SHOULD KNOW ABOUT THE REPLACEMENT OF ANTI-FRICTION BEARINGS

(Continued from Page 8)

inside a paper wrapper. This lubricant should not be washed from the bearing. It is virtually impossible to wash a bearing as clean as it was when the manufacturer lubricated it. After all, bearings are made in dirt free surroundings.

Keep bearings in their original packaging until you are ready to install them. Touch the bearing as little as possible because perspiration starts corrosion. Use clean lint-free rags. Never use cotton waste to wipe a bearing or its mating surfaces. Cleanliness counts.

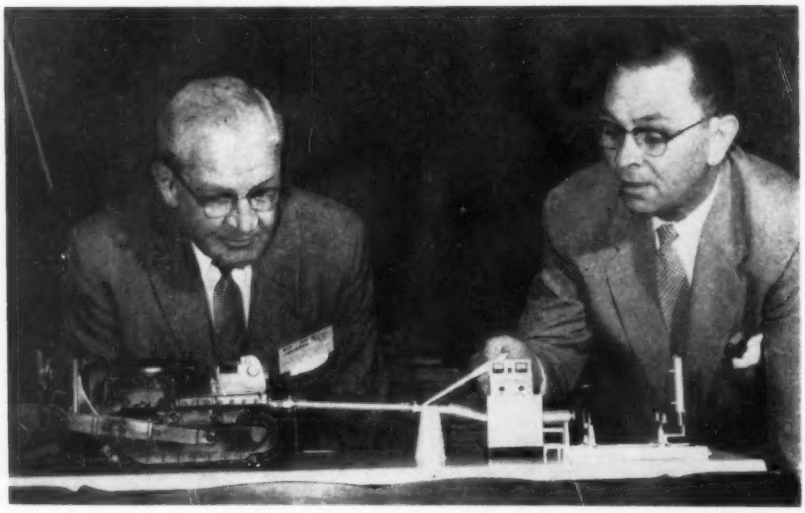
Serviceable used bearings also require special handling. Take time to examine the assembly. Countless bearings have been ruined because someone didn't know how to take the assembly apart and put it back together. Bearing pullers or an arbor press are handy items to have when removing or installing bearings. Improvised tools will work, but it is essential that considerable care be taken to avoid damage. When a piece of equipment is taken apart, the bearings should stay with the member to which they are tightly fitted. In the case of bearings which are made with separable parts—inner ring, outer ring and ball or roller assembly—both rings may often fit tightly. Always determine whether it is best to press or pull on the race or cup when the bearing is tight on the shaft or bore. Press or pull straight and square to keep the ring from cocking. A cocked bearing can easily score the shaft or housing or cause damage to the bearing itself. Never press or pull against bearing shields or separators. Remember that in most cases a bearing **can** be reused — if you remove it correctly.

After the bearing has been removed, wash it in a solvent until it is absolutely clean. Next, determine if it is still serviceable. Here are the reasons for replacing a bearing.

1. Broken or cracked ring.
2. Dented seals or shields.
3. Cracked or broken separators, balls, or rollers.
4. Flaked areas on balls, rollers or raceways.
5. Bearings which have been overheated. Overheated bearings are generally darkened to brownish blue or blue black.
6. Bearings with dented or "brinelled" raceways.

If the bearing is determined to be serviceable, apply a coating of light grease or other protective lubricant. Rotate the bearing slowly to make sure all surfaces are completely lubricated. Wrap in clean paper with the bearing's identification clearly marked on it. This practice will eliminate unnecessary handling.

In summary, remember these key points. Don't throw away serviceable bearings. Use the **right** bearing as listed in the manufacturer's current Parts Catalog if replacement is necessary. Keep bearings clean, exercising care during installation and removal to avoid damage.



● Introductory showing of the new "Clayton Universal Tractor and Engine Dynamometer Test Equipment" was made at a meeting of the National Standard Parts Association held at the Ambassador Hotel, Los Angeles. This equipment provides for checking power characteristics of Tractors and other "Off-Highway Equipment" without removing the engine from the chassis, and for Dynamometer Run-in and Test of basic engines and power units. Shown at left are J. A. Cortright, Vice-President in Charge of Sales, and George R. Mackey, Sales Manager of the Dynamometer Di-

SALEM "HERCULES" AUGERS FOR ELECTRIC DRILLS
Made to Withstand High Drilling Speed Whip And Torsional Strain Of Electric Drills.

Drills holes faster — Will not snap off shank or chip points — Outlasts four or five ordinary augers.
THE SALEM TOOL COMPANY EDgewood 7-3416 SALEM, OHIO, U.S.A.

vision of Clayton Manufacturing Company, using a model of the unit to point out salient features.

The Clayton Manufacturing Company is world famous for producing Engine and Chassi Dynamometers, and a complete line of highly efficient Steam Cleaners for more than twenty-five years.

The Universal Tractor and Engine Dynamometer Test Equipment will cover the horsepower range of all popular tractor models powered with engines rated up to 450 horsepower and developing up to 1800 lbs. ft. torque at 1000 r.p.m. at the Power Take-off, and all basic engines and power units with mechanical clutches or torque converters rated up to 700 horsepower, developing up to 2600 lbs. ft. torque from 1000 r.p.m. and weighing up to 24,000 lbs.

Use of the Clayton Tractor and Engine Dynamometer Test Equipment is made very simple and fast by the use of Clayton Universal Mounting Equipment and Adapters. Note: An open house and demonstration of this dynamometer equipment, as well as other new products will be held soon at Clayton's El Monte, California plant. If you wish to be represented **editorially**, notify Thomas Barnby, Public Relations Director, c/o The McCarty Company, Los Angeles.

● Manitowoc Engineering Corp. announces the publication of a 6-Page catalog describing the new Manitowoc 3-yd. Model 3600 shovel which is also convertible to crane, dragline and clamshell applications.

In addition to giving full specifications of the new 3-Yd. shovel, the bulletin outlines in detail the many exclusive engineering features that give the Manitowoc Model 3600 more muscle, more speed, and more output with less maintenance downtime than any other shovel in its class.

This attractive and informative booklet may be obtained from Manitowoc distributors, or by writing direct to Manitowoc Engineering Corp., Manitowoc, Wisconsin.

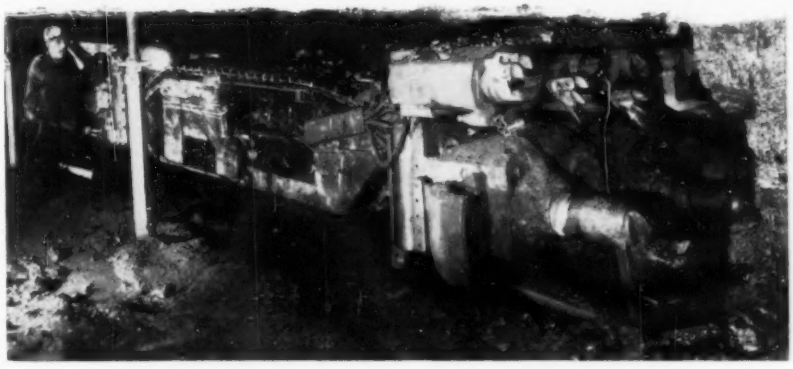
(Continued from Page 33)

ed against the original manufacturer's recommended wear limits. Only two piston rings. .001 out of tolerance, exceeded the limits. Bearings, pistons, cylinder liners, shafts and other moving parts still were well within the recommendations.

The only other work between installation and disassembly was performed at about 18,000 hours, when the heads on the V-type engine were cleaned and interchanged to eliminate carbon buildup. At the same time, valve guides were reconditioned.

Because of the low wear at 25,000 hours, the engine was reassembled with a new set of piston rings as the only replacement. The chief supervisor of the plant's equipment maintenance division at the plant, believes that the outstanding record of this engine is due largely to carefully observing service and maintenance recommendations.

Record tonnages being mined in such seams as No. 5 Indiana and No. 8 Pittsburgh with



JEFFREY 76 COLMOL

Remarkable production is being credited to the Colmol . . . average tonnages over a period of weeks of 550 per shift and peak tonnages in excess of 750 per shift.

The Colmol requires a minimum of maneuvering, helping to account for this highly efficient performance. It handles easily on its long, wide crawlers . . . can be turned in its own length . . . mines the coal without constant manipulation of controls.

Coal is broken from the face, not ripped or ground off. You get better overall screen consist, greater speed and efficiency. Colmol withstands the most severe operating conditions . . . operates with little noise or vibration.

In seams as low as 28"... or as high as 96"

Jeffrey Colmols step up your production rate, cut operating costs. Write for full details. The Jeffrey Manufacturing Company, 958 North Fourth Street, Columbus 16, Ohio.

JEFFREY

MINING • CONVEYING • PROCESSING EQUIPMENT...TRANSMISSION MACHINERY...CONTRACT MANUFACTURING

WE CURE MINING PAINS

We have the Best Selection of the Latest Type used Mining Machinery to be found anywhere and at lowest prices. See J. T. FISH before you Buy – Sell – Trade.

WE OWN WHAT WE ADVERTISE!

JOY EQUIPMENT—REBUILT

1—Joy 8AE Super 14BU Loader, rebuilt.
3—Joy 14-BU Loaders, low pedestal, 7AE.
2—Joy 14-BU Loaders, medium pedestal, 7RBE.
1—Joy 14-BU Loader, high pedestal, 7BE.
2—Joy 12-BU Loaders, 9E, latest type.
1—Joy 12-BU Loader,, 220 volt AC.
1—Joy 20-BU Loader, latest type.
1—Joy 11-BU Loader, latest type.
2—Joy 8-BU Loaders, 250 volt DC.
1—Joy 8-BU Loader, 34" overall height.
2—Joy 8-BU Loaders, 220 volt AC.
1—Joy curved Bar Head, complete.
2—Reliance 38-J Motors, 10 H. P.
6—Reliance 24-J Motors, 7½ H.P.
4—Reliance 10-J Motors, 5 H. P.
20—9-J Motors, 4 H.P.
6—New Wheel Units for Joy 6 SC Shuttle Car.
1—Goodman 660 Loader on cats, excellent.
3—Goodman 665 Loaders on cats, latest type.
2—Joy 6 SC Shuttle Cars, rebuilt.
1—Joy 5 SC Shuttle Car, rebuilt.
2—Joy 32E9 Shuttle Cars.
2—Joy 32E10 Shuttle Cars, rebuilt.
2—Joy 32E15 Shuttle Cars, rebuilt.
1—Joy 32E16 Shuttle Car, rebuilt.
2—Joy 42E16 Shuttle Cars, rebuilt.
1—Joy T-2-5 low pan Cat Truck.
1—Joy T-2-6 low pan Cat Truck with reel.
2—Joy T-1 Standard Cat Trucks, 220 AC.
1—Joy T-1 Standard Cat Truck, 250 DC.
2—Joy 11-B Cutting Machines, like new.
1—Joy 7-B Cutting Machine, like new.
3—Joy CD-22 Drills, like new.
2—Goodman 512 Machines, with Bugdusters.
1—Goodman Machine on Cats, 31" high. All hydraulic.
1—Goodman 512 cutting machine, perfect.
2—Goodman 512 cutting machines, 220 volt A.C.
1—LeeNorse low vein Machine Carrier on rubber.
2—Jeffrey 70 URB's, rubber-tired Cutters, Universal head, perfect condition.
1—Joy 11RU, rubber-tired Cutter with bugdusters, Universal head, like new.
2—Jeffrey 29UC Cutting Machines, Universal head, cuts anywhere in seam, 38" high, on cats, 250 volt DC.

LOCOMOTIVES

3—Jeffrey 13 ton, type MH-110, 36", 42" and 44" Ga.
2—Jeffrey 10 ton, type MH-110, 42" and 44" Ga.
1—Jeffrey MH-124, 6 ton, 24" overall height.
12—Jeffrey, 6 ton, type MH-88, 42", 44" and 48" Ga.
2—Jeffrey, 8 ton, type MH-100, 2" armor plate frames.
1—Jeffrey, 6 ton, type 2186, 22" above rail.
3—Jeffrey, 4 ton, type MH-96, 42", 44" and 48" Ga.
1—G. E., 4 ton, type 825 Locomotive, 22" high.
10—G. E., 6 ton, types 801, 803, 821 Locomotives, 42", 44" and 48" Ga.
1—G. E., 8 ton, type 822 Locomotive, 44" Ga.
3—G. E., 10 ton, type 809 Locomotive, 42", 44" and 48" Ga.
2—Goodman, type 33, 6 ton, 44" and 48" Ga.
3—Goodman, 8 ton, type 32A, 36", 44" and 48" Ga.
3—Westinghouse, type 902, 4 ton, 42" and 48" Ga.
2—Westinghouse, type 904, 6 ton, 44" and 48" Ga.
2—Westinghouse, type 906, 44" and 48" Ga.
2—Westinghouse, type 907, 10 ton, 44" and 48" Ga.
2—Diesel Locomotives, 8 and 10 tons, Excellent.
8—Jeffrey MH-78 Locomotive Units, cheap.

LOCOMOTIVES (Cont.)

4—Jeffrey MH-88 Locomotive Units, real bargains.
6—Jeffrey MH-100 Locomotive Units, reasonable.
Locomotive Trucks and Spare Armatures for all the above.

TIPPLE EQUIPMENT

1—Cedar Rapids portable super Screening Plant.
1—Allis Chalmers 5'x14' Rippflo Vibrator.
1—5'x14' Robins double deck Vibrator.
1—4'x10' Robins Gyrex Vibrator.
1—Roberts & Shaffer tandem Hydro-Separator. Belt Loading Boom.
1—Robins Car Shakeout.
10—Crushers, various sizes.
Feeders, Drag Conveyors and Loading Booms.

CUTTING MACHINES

2—Jeffrey 70URB Cutters, rubber-tired, Universal Head, low vein.
3 Jeffrey 29UC Universal Machine on Cats.
1—Joy rubber-tired 11RU Cutter with bugdusters.
1—Goodman on Cats, 31" overall height.
1—Baby Goodman 212, rebuilt, 250 volt D. C..
1—Baby Goodman 212, rebuilt, 220 volt, 3 phase AC.
1—Goodman 312, 18" high.
2—Goodman 512's with Bugdusters, like new.
4—Goodman 512's, rebuilt, or as removed from service.
2—Joy 11B Cutting Machines, rebuilt.
2—Goodman 512 Cutting Machines, 220 volt A. C.
6—Goodman 12AA's and 112AA's.
2—Goodman 324 Slabbers.
2—Goodman 724 Slabbers.
6—Jeffrey 35L's, like new, 17" high.
2—Jeffrey 35L's, on low vein trucks.
1—Jeffrey 35L, 220 volt AC.
15—Jeffrey 35B's and 35BB's
2—Jeffrey 29B's on track.
2—Jeffrey 29C's track mounted.
1—Jeffrey 29L on track, perfect.
2—Sullivan CR-10's, 15" high.

LOADING MACHINES

16—Loaders, all types.
2—Jeffrey 61 CLR's on rubber, 26".
3—Jeffrey L-500 Loaders.
2—Myers Whaley No. 3 Automat Loaders.
2—Clarkson Loaders, 26" above rail.

CONVEYORS

2—Jeffrey 52-B, 30" Conveyors, 1500' each. Excellent.
4—Joy 30" Underground Belt Conveyors, 500' to 2009' each. Excellent.
1—Barber Greene 30" Belt Conveyor, 1000'. Excellent.
1—Robins 30" Belt Conveyor, 1000'.
2—Jeffrey 52-B, 26" Conveyors, 1200' each.
3000' Conveyor Belt, 30".
2—61EW Elevating Conveyors
2—61WH 15" Room Conveyors, 300 ft.
2—Joy 15" Room Conveyors, 300'.
2—Joy 20" Conveyors, 300'.
4—Joy Ladel UN-17 Shakers.
10—Goodman G-12½ and G-15 Shakers.
3—Long 400 DBH 15" Chain Conveyors, 25 H.P. Motors, new.

CONVERTERS AND DIESEL PLANTS

1—50KW. G. E. TC-6, 275 volt Rotary Converter.
2—100KW. G. E. TCC-6's, 275 volt, Rotary Converters.
1—150KW. G. E. HCC-6, 275 volt, Rotary Converter.
1—150KW, 6 phase, Allis Chalmers Rotary Converter, 275 volt DC, perfect.
1—200KW Allis Chalmers, Rotary Converters 6 phase, 275 DC, perfect.

Converters and Diesel Plants (Cont.)

1—200KW, G. E. HCC-6 Rotary Converter, 275 volt DC.
3—300KW, G. E. HCC-6 Rotary Converters, 275 DC.
3—300KW Westinghouse, 6 phase, Rotary Converters, 275 volt DC.
1—375KW Westinghouse Rotary Converter, 275 volt.
2—500KW Westinghouse Rotary Converters, 275 volt DC.
1—200KW Westinghouse Rotary Converter, 275 DC.
(all the above with 6900/13000 and/or 2300/4000 primary transformers)
2—150KW MG Sets, General Electric and Westinghouse.
1—200KW MG Set, Westinghouse, rebuilt.
1—200KW MG Set, General Electric, perfect.
2—150KW Allis Chalmers MG Sets, 275 DC volt, excellent, 220-440 AC volt.
1—300KW Westinghouse, 600 volt MG Set, rebuilt.
2—300KW Westinghouse, 600 volt, 6 phase, Rotary Converters.
4—500KW Westinghouse, 600 volt, DC, 6 phase, Rotary Converters.
1—500KW HCC-6 Rotary Converter, 6 phase, 600 volt DC.
1—Cummins 125 KW, Diesel with 250 volt DC Generator.
1—G. M. C. Diesel Plant with 60 KW Generator, 275 volt DC.
1—G. M. C. Diesel Plant with 85 KW Generator, 275 volt DC.
1—D-13,000 Caterpillar Diesel with 75 KW Generator, 275 volt DC.
1—Allis Chalmers Natural Gas Engine with 100KW Generator, 275 volt DC.
1—700 H. P. Shaft Hoist, complete.
Complete steam plant, will sell all or any part.
Boilers, like new, 1100 H. P. and 500 H. P. Also transformers, turbines, etc.
1—Complete Tipple with Cleaning Plants.

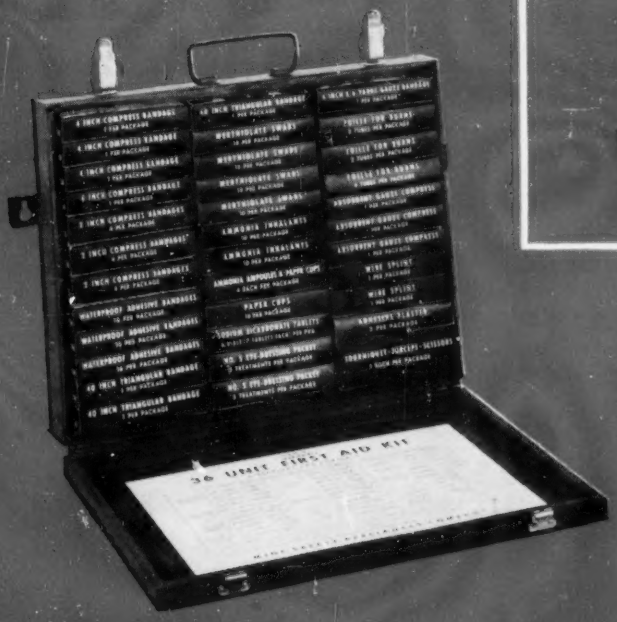
MISCELLANEOUS

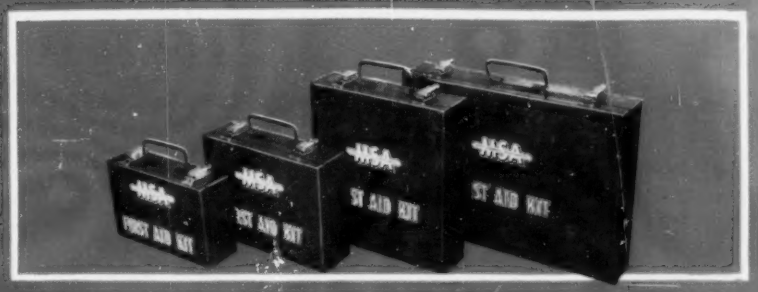
20—Jeffrey Moiveyors on rubber tires.
1—¾ Yard Shovel and Back Hoe.
1—¾ Yard Crane on Cats.
Battery Supply Tractors, rubber tired.
1—Cantrell Air Compressor on rubber tires.
10—Air Compressors, 1 H.P. to 40 H.P.
40 Mine Pumps, all types.
1—Differential 40 Passenger Man-Trip Car.
6—MSA Rock Dusters.
1—American Mine Door Track Cleaner—new.
2—Phillips Carriers, 44" and 48" Ga.
2—Barber Greene self propelled Bucket Elevators.
Pipe, Plastic, Steel, Transit, all sizes 1" to 6".
45 Mine Cars, drop bottom, 42" Ga.
30 Mine Cars, drop bottom, 44" Ga.
100 Mine Cars, 18" high, end dump, 44" Ga.
100 Mine Cars end dump and drop bottom, 20" high, 48" Ga.
1—10 ton Mine Car Scale with Recorder.
1—150 ton Railroad Track Scale.
15—Brown Fayro HKL and HG Car Spotters.
1—2 ton Differential Slate Larry.
Incline Hoists, 25 to 50 H. P.
1—Jeffrey 6' Aerodyne Fan.
1—Jeffrey 8' Aerodyne Fan.
1—Storage Tank, 8,000 Gallon.
2—Storage Tanks, 4,000 Gallon.
1—Storage Tank, 12,000 Gallon.
10,000 Five Gallon G. I. Cans, screw lids.
800 tons Relaying Rail 25# to 80#.
10 tons Copper Trolley and Feeder.
300 Transformers from 1 to 2,000 KVA, 110 to 13,000 primary volts.
400 Electric Motors, 3 to 250 H. P.
Huge stock of mine supplies.
Thousands of Other Items.

IF YOU TRADE BEFORE YOU CONTACT US — WE BOTH LOSE MONEY

J. T. FISH

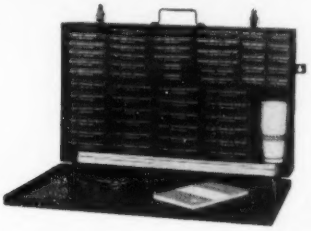
PHONE 2825 **LOGAN, W. VA.**





M-S-A Type D ALL-WEATHER FIRST AID KITS

When emergencies call for first aid, these kits provide all the advantages for quick, complete treatment. Unit packages, easily replaced, are arranged for fast selection, contain one or more complete dressings or treatments for each injury. All dressings are sterilized and ready for use. Cellophane package wrappings protect contents. The kits, available in 10, 16, 24, and 36 units, are made of 20-gauge steel, with carrying handle, and mounting brackets. Case is dust and moisture-proof. Ideal for carrying on jeeps, motors or other mechanized equipment. Complete instructions with each kit. Write for details.

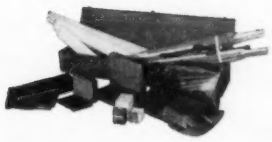


M-S-A MINER'S FIRST AID CABINET

Contains complete assortment of first aid material and supplies. Ideal for mine hospital or dressing stations. Contents conform to U. S. Bureau of Mines recommendations.

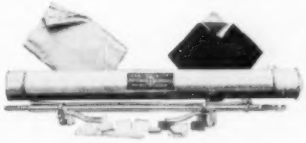
M-S-A FOILLE BURN KIT

Contains four 10-ounce Foille Aerosol Sprays, easy-to-use Type D first aid dressings and accessories. Stored in All-Weather steel case. Permits fast effective burn treatment.



M-S-A EMERGENCY FIRST AID OUTFIT

Ideal for storage underground where a compact unit is needed. Contents selected to meet practically every emergency. Includes two first aid kits, blankets, splints, Redi-Heat Blocks, stretchers. Sturdy steel case.



M-S-A STANDARD STRETCHER OUTFIT

Complete assortment of first aid dressings and supplies arranged in a strong dust-proof canister. Contains stretcher, blankets, first aid materials, splints. Designed for first aid rooms, dressing stations.

M-S-A . . . headquarters for First Aid Equipment

Above are a few of the many first aid supplies and treatments available from M-S-A. This material is the result of years of experience in serving the mining industries' requirements.

Our knowledge of emergency needs has developed the design and contents of our first aid line.

You will find complete information in our Mining Catalog•••••28 pages are devoted to illustrations and detailed information on these and many other first aid supplies. We will be happy to send you a copy upon request.

MSA
SAFETY EQUIPMENT HEADQUARTERS

When you have a safety problem, M-S-A is at your service . . . our job is to help you

MINE SAFETY APPLIANCES COMPANY
201 North Braddock Avenue, Pittsburgh 8, Pa.
At Your Service: 77 Branch Offices in the United States and Mexico

MINE SAFETY APPLIANCES CO. OF CANADA, LTD.
Toronto, Montreal, Calgary, Edmonton, Winnipeg, Vancouver, Sydney, N.S.

- **LIMA MODEL 1201** dragline, with 80' boom and 3 cu. yd. bucket. Cummins diesel engine. Rebuilt in September. Available immediately.
  PRICE ---------- **$47,500.00**

- **LIMA MODEL 1201** hi-front shovel. Good operating condition. Cummins diesel engine. Now available.
  PRICE ---------- **$27,500.00**

- **LIMA MODEL 1201** dragline. 80' boom and 3 cu. yd. bucket. Now available.
  PRICE ---------- **$30,000.00**

- **MANITOWOC MODEL 3500** hi-front shovel in good operating condition. Now available.
  PRICE ---------- **$25,000.00**

- **MANITOWOC MODEL 2000** standard front shovel. Good condition. Immediately available.
  PRICE ---------- **$18,500.00**

- **P & H MODEL 655** combination dragline and standard front shovel. Excellent condition. Available now.
  PRICE ---------- **$18,500.00**

- **LORAIN MODEL 40** ¾ yd. shovel with gas engine. Now available.
  PRICE ---------- **$4,500.00**

HIGHWAY EQUIPMENT COMPANY

6465 Hamilton Avenue Phone: EMerson 1-3600 Pittsburgh 6, Pa.

SHOVELS — DRAGS
CRANES
DRILLS — EUCLIDS

9-W Bucyrus Monighan Elec. Drag, 200', 10 yd.
5150 Bucyrus Monighan Drag, 165', 9 yd.
625 Page Walking Drag, 150', 10 yd.
723 Page Walking Drag, 130', 10 yd.
621-S Page Walking Drag, 135', 6 yd.
2400 Lima Dragline, 130', 5 yd.
5-W Bucyrus Monighan Drag, 120', 5 yd.
4500 Manitowoc Drag, 120', 5 yd.
3900 & 3500 Manitowoc Cranes
111-M Marion Drag, 100', 4 yd.
1055 P&H Drag, 100', 3½ yd.
170-B Bucyrus Erie 6½ yd. Elec. Shovel
150-B Bucyrus Erie 6 yd. Elec. Shovel
4500 Manitowoc 5 yd. H. L. Shovel
120-B Bucyrus Erie 4 yd. Elec. Shovel
1055 P&H 3½ yd. Standard Shovel
1201 Lima 2½ yd. H. L. Shovel
3500 Manitowoc 2 yd. H. L. Shovel
Also, various smaller Shovels and Drags
400 Reich Truck Mounted Rotary Air Drill
600 Reich Heavy Truck Mounted Rotary Air Drills
750 Reich Heavy Truck Mounted Rotary Air Drills
McCarthy Coal Recovery Auger Drills
Dozers, Scrapers, Graders, Front End Loaders
Euclid Trucks—Rear and Bottom Dump

FRANK SWABB EQUIPMENT CO.
313 Hazleton Nat'l Bank Bldg.
Hazleton, Pa., GLadstone 5-3658

FOR SALE

P and H Truck Crane

20 Ton ¾ yd. capacity, Model 255A
30' Boom, Hooks and Out Riggers
Powered by White Gasoline Engines

PRICE — $17,500.00

TASA COAL COMPANY
725 Liberty Avenue
Pittsburgh 22, Penna.

It Pays to Advertise in Coal Mining

COAL STRIP WANTED

Complete with equipment, must be low down payment and reasonable terms. All details first letter, price, terms, haul, coal, cover, tipple, equipment, etc.

ROLLING HILLS CONST. CO.
884 Edgewood Ave. Pittsburgh 34, Pa.

"FASTER FROM FOSTER"
RAIL
& ALL TRACK EQUIPMENT
Nation's Largest Warehouse Stocks
L. B. FOSTER CO.
PITTSBURGH 30 • ATLANTA 8 • NEW YORK 7
CHICAGO 4 • HOUSTON 2 • LOS ANGELES 5

It Pays To Advertise
In Coal Mining

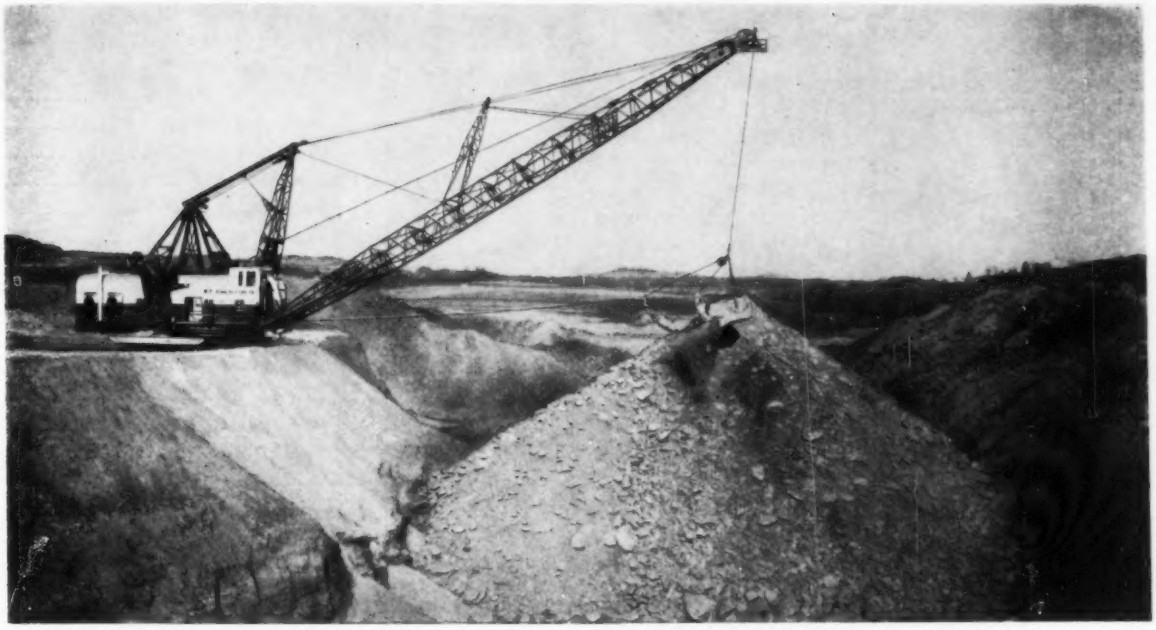
FOR SALE

Bucyrus 9-W, diesel dragline, 165' boom, 9 yd. bucket, excellent condition. Western Penna. $175,000 includes approx. $20,000 spare parts.

ROLLING HILLS CONST. CO.
884 Edgewood Ave. Pittsburgh 34, Pa.

296,000 yds. Overburden per Month

averaged by this Model 728 Page Dragline with 150 ft. boom and 12 yd. bucket.



Overburden 60 to 80 ft., coal seam 34 in., so average ratio of overburden to coal is 24.7
Working three 8-hr. shifts, six days a week, uncovered

144,000 tons of Coal in 12 Months

RATIO 24.7 to 1

Owned by W. P. Stahlman Coal Co., Corsica, Pa. — and Mr. Stahlman is so well pleased with this machine's performance that he is now erecting another Model 728 Page just like it.

Having previously used three 5 yard, 120 ft. boom draglines, Mr. Stahlman knows the big reduction in stripping costs made by the 12-yd., 150 ft. boom Page.

And you need SPEED for low cost stripping. Page walkers swing unusually fast, with a correspondingly fast hoist line speed. The result — quicker cycles and more yardage.

And you need LOW MAINTENANCE COST such as reported by users of Page Draglines with V-Type Diesels, designed specifically for dragline work — with bigger bearings and pistons, and slow speed, 450 RPM — producing ample power with low operating cost. (Can also be furnished with Electric Power).

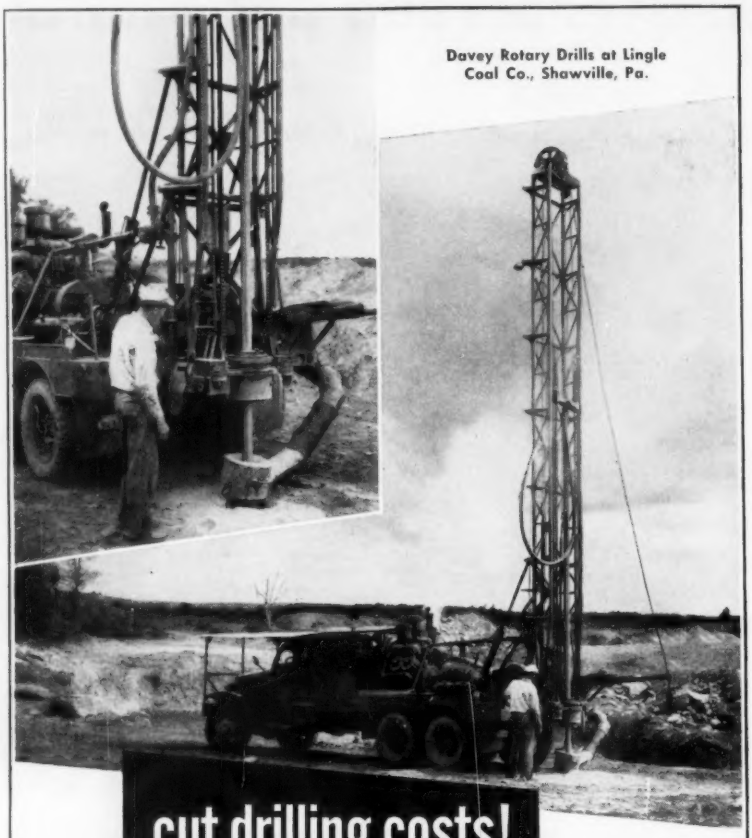
For MORE RECORDS of increased outputs and lower stripping costs — write, wire or phone —

FRANK SWABB EQUIPMENT CO.
Hazleton National Bank Bldg.
Hazleton, Pa., Phone Gladstone 5-3658

For High Production and Lowest Operating costs —

NOTHING equals this PAGE 700 series

SINGLE DECK WALKING DRAGLINES



Davey Rotary Drills at Lingle Coal Co., Shawville, Pa.

cut drilling costs!

DAVEY

ROTARY DRILLS

For faster, more economical drilling . . . increased coal production at lower costs, leading strip operators rely on Davey. Suitable for mounting on any make of truck, Davey Rotary Drills move fast between blast holes . . . are ideal for low cost core drilling with air . . . easy to set in drilling position.

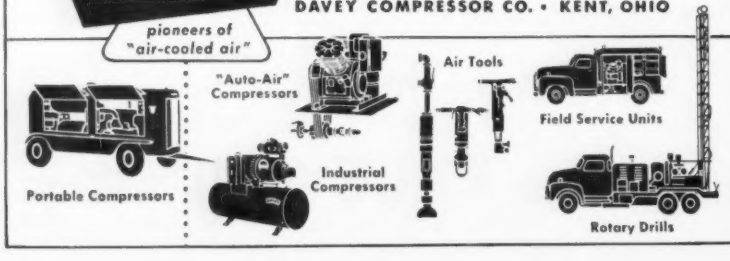
Daveys are available in 8 different models—air blast, mud pump, or combination types. Rated capacities to 3,500 ft. Outstanding features include choice of power take-off or separate power unit operation, automatic hydraulic feed, hydraulic pull down, heavy-duty rotary table, rugged tubular box-type mast . . . AA-7018

Write for full details!

DAVEY

pioneers of "air-cooled air"

DAVEY COMPRESSOR CO. • KENT, OHIO



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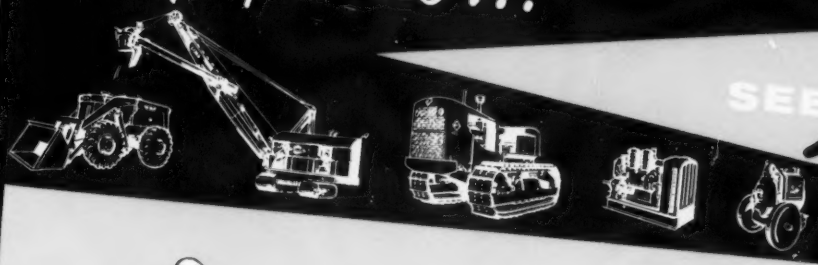

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